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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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MINUTE TO THE MEMORY OF EUGENE VANDERPOOL BY THE TRUSTEES OF THE GAS EDUCATIONAL FUND.

At a meeting of the Trustees of the Gas Educational Fund, held last Wednesday, the following minute to the memory of the Board's Treasurerer, the late Eugene Vanderpool, was adopted:

"Eugene Vanderpool, member and treasurer of this Board from its foundation, died July 12th, 1903. By Mr. Vanderpool's death this Board loses an interested, efficient and conscientious officer and member. To the knowledge that his judgment, founded on inherent good sense and tempered by experience in positions of responsibility in engineering and financial institutions, was influencing the actions of this Board, has been due, in large measure, the confidence of the gas profession in our undertaking.

"This Board will miss the wise counsel of its late member, and the Trustees mourn the loss of a man whose personal qualities made association with him a privilege and a pleasure.

"The Trustees, desiring to place on record their appreciation of his services, their feeling of personal sorrow and loss by his death, and their sympathy with his family in this bereavement, have ordered that this minute be spread upon the records, that a copy be sent to his family and published in the AMERICAN GAS LIGHT JOURNAL and *Progressive Age*. ALFBED E. FORSTALL, Secy."

BRIEFLY TOLD.

ELEVENTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.—"The 11th annual meeting of the Pacific Coast Gas Association was brought off successfully in San Francisco, Cal., on Tuesday, Wednesday and Thursday of last week, under the careful, painstaking and prompt direction of the President, Mr. M. C. Osborn. The weather was fine and the attendance was excellent—64 were on hand and thoroughly interested in the work of the convention. The names of 19 new members were placed on the rolls, and Mr. F. H. Eichbaum, who is about to retire from the gas business—dear old veteran that he is—was elected to honorary membership. The amendment to the constitution and by-laws creating an associate membership list was adopted, and 14 associates were admitted. The report of the Library Committee showed good work done during the year, but it was and is hampered in fully developing the work through lack of funds. Secretary and Treasurer Grimwood's annual reports showed the Association to be in good condition. The President's address was characteristic of its compiler, and was listened to with close attention. One of the recommendations contained therein was to change the name of the Association to "Gas and Electric." The proposition was negatived by the members with surprising promptness and vim. The papers were well received, especially the one by Mr. John A. Britton, on "High Pressure Gas Distribution," and that by Prof. G. A. Bobrick on "Liquid Air and Its Application to the Gas Industry." The Novelty and Wrinkle Departments contributed greatly to the technical value of the meeting, but the Question Box was neglected. The lecture by Prof. Bobrick on "Liquid Air," the first

LIBRARY OF CONGRESS
JUL 27 1903
SMITHSONIAN DEPOSIT.

evening was largely attended, many ladies being present. The lecture was profusely illustrated by very interesting demonstrations. A fine supper, served in the Techau Tavern, followed the lecture. The officers elected were: President, W. A. Aldrich—the unterrified; Vice-President, L. P. Lowe; Secretary and Treasurer, J. B. Grimwood; Directors, Messrs. Martin, Keyes, Pennoyer and Colquhoun. The editors of the Wrinkle, Novelty and Experience Departments were re-elected, and the Library Committee was continued. The Advisory Board consists of Messrs. Britton, Jones and Papst, and Messrs. Britton, Lowe and Grimwood were named for the Committee on Ways and Means to Establish Headquarters. There was in fact so much business to be transacted that in reality the discussions on the papers were very often curtailed at most interesting points in the debate. One short topic, submitted by Secretary Grimwood on "Peak Loads in the Gas Business," had to be taken as read.

"The banquet at Delmonico's was a most enjoyable affair. Mr. Jno. A. Britton, was toastmaster, and 53 guests helped him along in his efforts. The first course was served at 8:45, and good byes were spoken—well, some time afterwards. The outing on Thursday was simply grand, and the weather was superb. The schedule was a trolley ride around the city, and a visit to the Mechanics' Library. An elaborate luncheon was served at the Cliff House, and from its porches one could get actual glimpses of the Farallone Islands, which amply attest to the gorgeous atmospheric conditions. The famous Hawaiian quartette furnished delightful music, and 115 guests shared the festivities. The ladies participated in the speechmaking, and a feature of the feast was a standing toast to Ex-President Joseph B. Crockett, who was prevented by illness from attending the meeting. The route home included a visit to the great Sutro baths, and a charming view of the Pacific and bay from an appropriately selected point of vantage. The outing was over at 6, and its ending marked the completion of the best meeting the Pacific Coast *Gas* Association ever held.—B. G."

NOTES—

SOME time ago we reported the merging of several gas, electric and power companies, that were doing business on individual account in and about Easton, Pa., under the name of the Easton Gas and Electric Company, and also gave the names of those who were designated by the shareholders to conduct its affairs. Perhaps a bit of repetition in respect of the latter may not be out of place. The executive staff is: President, Mr. Chester Snyder; Vice-President, Mr. Fred. R. Drake; Treasurer and General Manager, Mr. A. B. Beadle; Secretary, Mr. J. W. Fox; Superintendent, Mr. E. G. Holzer. The new Company (and we sincerely hope it will not have to take over much more deadwood in the next decade) is progressive, and its owners mean to give Easton and its suburbs the gas and electric service which the residents are ready and willing to pay for. In any event the Company has been putting in Superintendent Holzer's way plenty to do along the line of extensions to the main system, additions to the manufacturing plant, and so on—we take it for granted that our readers know that Easton, Pa., and Phillipsburg, N. J., are covered in the Easton Company's possessions. So far this year Mr. Holzer has completed the placing of 9 miles of mains, and about an equal length is bargained for. The mains range in diameter from 4 inch to 10-inch, and the system includes a 4-inch high pressure line, laid for the supply of South Easton. Nearly 600 services have been hooked up to the new lines, and 1,100 fuel gas appliances have been placed. New retorts have been put in the coal gas benches, and by September first the added water gas plant will be completed. The betterments include a set of purifiers, 14 feet by 14 feet by 8 feet. In the electrical department many improvements are being made. The new station on Green street has been completed and is now furnishing power. The plant consists of two 650-horse power gas engines, a 1,000-horse power generator and a producer gas outfit The water power plant on the South Side is to have new head gates, and the Ferry street station is being improved by the addition of thoroughly modernized, up-to-date machinery, new switchboards, etc. The Company is doing all, if not more, than it promised, and it is now up to the residents of the district to serve themselves through taking advantage of that which the Company reasonably offers them in the receipt of light, heat and power.

THE New Haven (Conn.) Gas Light Company has accepted the plans drawn by Mr. A. H. Hill, C.E., for its new dock, to be constructed on the Mill river side of its property. The contract for the work has been awarded to the Riter-Conley Company, of Pittsburg, Pa.

A QUEER accident is reported from Milwaukee, Wis. Some nights ago a horse in the service of the livery stable, 720 Broadway, that city, which livery stable is the property of Mr. W. F. Emmett, was being housed after returning from a call that terminated about midnight. In the back of the stall that housed him was a gas meter which served to supply light to the premises. The meter rested on a bracket about 6 feet from the floor. Either through lack of food, water or something else, the horse, having been properly tied, left to his rest by the stable hands, commenced to raise his heels with the result that the meter was kicked to pieces and the escaping gas had full sway. Four of his companions and the "kicker" were speedily rendered drowsy and so were some of the stable hands, but a "surviving" one of the latter was equal to the situation, and after he had thrown the doors wide open (no matches for him) it was only a thing of short time when matters were righted. A stopcock at the sidewalk greatly simplified the situation.

THE Passadena (Cal.) Consolidated Gas Company has sold out all its possessions to the Los Angeles (Cal.) Lighting Company. So ends another scheme of the Lowe type of opposition. No "official organs" for the Lowes.

AT the second annual meeting of the Cadillac (Mich.) Gas Company, the officers elected were: President, D. L. Quirk; Vice-President, E. F. Sawyer; Treasurer, C. R. Smith; Secretary, George D. Van Vranken. The business of the Company, as shown by the annual reports of the officers, maintains a most satisfactory growth.

MR. J. J. FLYNN, representing the proposed new gas company for Barre, Vt., has asked for an extension of time in which to complete the plant, as specified in the franchise. The impression in Barre is that Mr. Flynn and his friends do not mean business.

AT the annual meeting of the Fulton County, N. Y. Gas and Electric Company, the headquarters of which are in Johnstown, no change was made in the executive management.

MR. CHAS. A. LEARNED, Superintendent of the Meriden (Conn.) Gas Light Company, is busily engaged in making important main extensions. He reports a brisk traffic in the placing of gas stoves, ranges and "smaller goods."

THE Standard Gas Company, of South Amboy, N. J., has been reorganized. Its new title is that of the Citizens' Light and Fuel Company.

IT is reported on good authority that the Oshkosh (Wis.) Gas Light Company has arranged for the purchase of the properties of the Oshkosh Electric Light and Power Company, which latter concern has been in the hands of a receiver for some time.

THE Logan Natural Gas Company and the Sandusky (Ohio) Gas and Electric Company have agreed to consolidate.

AT the annual meeting of the shareholders in the Municipal Gas Company, of Albany, N. Y., the following officers were elected: Directors, A. N. Brady, Wm. McEwan, Robt. C. Pruyn, Jno. A. Delehanty, Jno. Bowe, H. G. Young and William J. Walker. President, A. N. Brady; Vice-President, Robt. C. Pruyn; Secretary and Treasurer, Henry Bronk; Engineer, Frank Dunn.

Blast Mains.

The *Engineering Journal* says that pipes for the transmission of air in metallurgical works are made usually of galvanized sheet iron, closely riveted and soldered at the joints. The gauge of the iron should vary according to the size of the pipe. For low pressure, a pipe of 54-inch diameter should be of No. 18 gauge, while pipes of 42-inch, 30-inch and 24 inch should be respectively of No. 20, 22 and No. 24 gauge. For higher pressures, such as are used in lead smelting, heavier iron should be employed. Thus, it is recommended that a main blast pipe of 60-inch diameter should be made of as heavy as No. 8 steel.

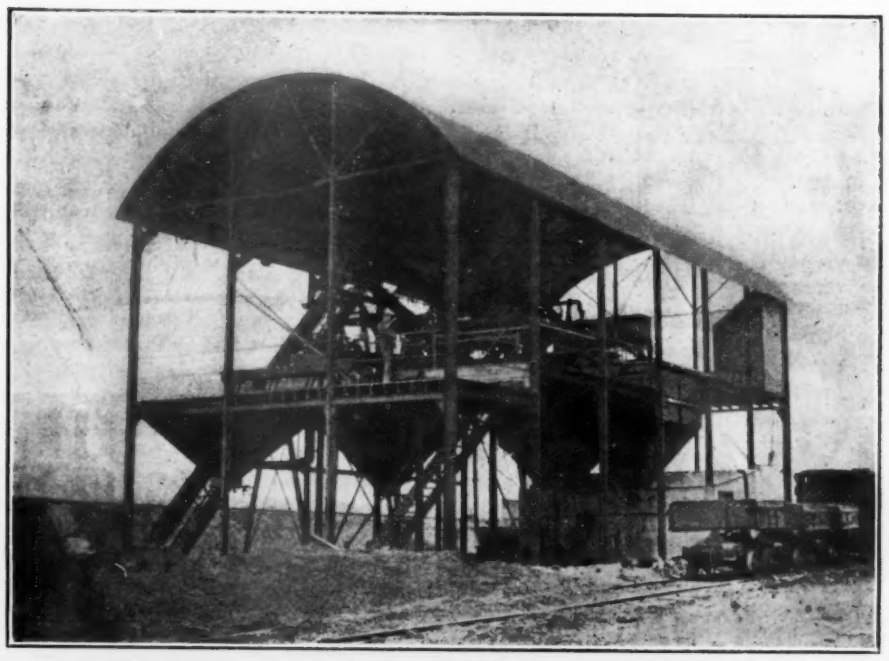
In putting up blast pipes, care should be taken that there be no sharp angles or turns. Stove pipe elbows, so called, should always be avoided and turns of direction of 90° should be constructed, in the case of round pipe, with at least five pieces, and a radius of curvature of the inner side of the elbow at least equal to the diameter of the pipe. This proportion of radius to size holds whether the pipe be round or rectangular.

Branch pipes should not butt squarely into the side of the main pipe, but a branch nipple should be cut into and securely attached to the pipe at an angle of 45°, the remainder of the change in direction being made by the use of a half elbow. After taking out the branch, the main pipe may be reduced in area to correspond with the less quantity of air it has to carry, but the reduction in area should be very gradual, the common practice being to make the taper equal in width to a sheet of galvanized iron, which, with the usual 30 in. wide sheet, will give a net length of 28 in. when the pipe is put up.

Wherever a division of the main pipe is to be made, a breeching piece should be put in, constructed so as to divide the air currents in such a way that it will be split equally by the opposing acute angle.

A Machine for Sorting and Washing Pan-Breeze [1]

The sorting of pan-breeze from the furnaces of retort houses into more or less (generally less) salable classes has hitherto been a somewhat laborious and tedious process, the work having had to be done by hand. Ever willing to encourage the development of anything that promises to secure economy in the manufacture of gas, the South Metropolitan Gas Company, London, England, recently ordered the erection at their East Greenwich works of a washing and screening plant by which this portion of the work is performed practically automatically, and with an economy that could not be approached by hand labor. The plant, which was erected as an experiment, has been at work for some weeks now, and when a representative of the *Gas World* inspected it a few days ago it seemed to be giving the greatest possible satisfaction. Of course, as is the case with almost all new processes, the few weeks' work has disclosed some little weak points in the arrangement, but these are in course of being remedied.



The Pan-Breeze Sorting and Washing Machine at East Greenwich.

Description of the Apparatus.—The plant has been erected at a convenient position adjoining the clinker tip in the coke loading yard. Speaking generally, the whole of the apparatus is contained on an elevated floor covered by a light corrugated iron roof. It is compact, and the disposition of the various parts seems all that could be desired. The pan-breeze from the retort houses is brought to the boot of an elevator in small wagons drawn by locomotives. The elevator carries it up to a revolving cylindrical screen, arranged horizontally on the elevated floor. The breeze proper falls through the fine mesh of the first part of the screen and is directed by a shoot into a hopper. The next part of the screen is of wider mesh, and through this the coke and smaller lumps of clinker fall into two long troughs or races, which are erected at a considerable slope on the upper floor. On the ground floor there are a water tank and a pump, by means of which water is raised to the upper ends of the troughs or races It should be stated here that the screen is fixed about midway in the length of the races. In each race there is an endless conveyor of special form, solid blades upon which travel along the bottom of the race, the return of the conveyor being carried upon saddles straddling the race.

As the material falls into the races, it banks up against the blades of the conveyors, until the downward rush of water carries the grit and dirt and the light coke over the tops of the blades and down to the lower ends of the races. For convenience of description it will be better here to follow the upward course of the conveyors, returning later to the coke which we have left at the lower end. The heavy lumps of clinker, not being disturbed by the rush of water, settle against the upper sides of the conveyor blades, and are carried to the upper ends of the races, where they drop into a short length of Zimmer conveyor arranged transversly to the races. This conveyor carries them to another overhead hopper, from which they can be loaded into carts or wagons. Of course, as is to be expected, some heavy lumps of coke are carried into this hopper with the clinker, and these are picked out by hand in the process of loading.

Having disposed of two selections of the crude material brought from the retort houses, we return for a moment to the revolving screen. We have said that the breeze proper falls through the first section of the screen and the coke through a wider meshed second section. A third section of the screen is solid, and all that does not pass through the first two sections is delivered from this third section or to another short length of Zimmer conveyor, laid end on to the screen. This, which is mostly clinker, with some large lumps of coke which have failed to pass through the second section of the screen, is delivered by the conveyor into a third overhead hopper, from which it is loaded and picked, as in the case of the clinker at the upper end of the apparatus.

Returning now to the lower end of the races, where we left the coke, the coke and the water, the latter containing in suspension all the dirt contained in the material fed into the races, fall upon a third Zimmer conveyor, leading transversely to another hopper. The first part of this conveyor is formed of perforated plates, through the perforations in which the water and the dirt fall into a settling tank, allowing the coke to go on, dry and clean, to the hopper. From the overhead settling tank the water flows to a second settling tank on the ground floor, and thence to the feed tank of the pump, so that it is used over and over again in the races, only a comparatively small "make up" being required.

The Zimmer Conveyor.—The pump, the elevator, the screen, the race conveyors and the Zimmer conveyors are all driven by a 12-horse power "Stockport" gas engine placed on the ground floor. As the Zimmer conveyor, which figures so largely in the completed apparatus, may not be familiar to all our readers, a word of description may be devoted to it. But it is so simple that little description is needed. It is merely a flat-bottomed trough, supported upon jointed legs, which is given a slight reciprocating motion by means of an oscillating action. The result is that the trough moves gently backwards and forwards—the length of the stroke being about an inch—and the material on the trough is caused to travel quietly in one direction in a regular stream, without the slightest jostling or breaking action, such as might be expected at first sight. Indeed, more than one gas engineer has had cause to alter his preconceived

1. The *Gas World*.

notions of this conveyor after having had an opportunity of seeing it at work.

Results and Cost.—A careful inspection of the whole plant, which has been erected by the Hardy Patent Pick Company, Limited, Sheffield, leaves one with a decidedly favorable impression of its efficiency and usefulness. The condition of the breeze proper seems to leave nothing to be desired, and the coke delivered at the lower ends of the races and the clinker delivered at the upper ends are thoroughly clean. It is true that, as seen working, there was some coke among the clinker and a few bits of light clinker among the coke, necessitating a small amount of hand picking to arrive at perfection; but this is a slight defect which may be reduced. As it stands, the apparatus appears to be an efficient and an economical one for dividing into three clean and usable qualities a heterogeneous mixture which has hitherto given more trouble to get rid of than perhaps it was worth.

Although only three classifications are made with the machine at work at East Greenwich, it does not necessarily follow that this is the limit of the application of the general principle. Indeed, a moment's consideration will show the engineer that only a little ingenuity is required to increase the number of classifications almost indefinitely. Of course, a multiplicity of classifications is not required in the work upon which the machine is engaged at East Greenwich; but it will be readily understood that the application of the machine is not confined to gas works requirements.

As to cost, the makers inform us that, taking a 300-ton plant as a basis, the cost for labor will not exceed 1½ cents per ton of material treated, and that the total charges, including capital charges, maintenance and depreciation, will not exceed 6 cents per ton of material. If this should be so, the new machine should have a useful future before it, for there can be no doubt that the assorted materials coming from it have a remarketable value that they did not possess before.

Something about Gas Works in the United Kingdom.—No. I.

[Prepared for the JOURNAL by MR. FREDERIC EGNER.]

In your issues for April 27th, May 4th and 11th, numbers of the current year, there was published "A Review of the Eighteenth Annual Report of the Massachusetts Board of Gas and Electric Light Commissioners," which it gave the writer some pleasure to present to the readers of the JOURNAL. The present paper deals with the "Gas Undertakings" of England, Ireland and Scotland, and is abstracted from "Parliamentary Papers Nos. 330 and 331, of the Honorable, the House of Commons," and ordered printed by the representative body on the 6th of August, 1902. Messrs. Eyre & Spottiswoode, "Printers to the King's Most Excellent Majesty," are the publishers, and from whom copies may be purchased.

There are two pamphlets, size 9½ by 14 inches. No. 330, "Relates to All Authorized Gas Undertakings in the United Kingdom Other Than Those of Local Authorities," and contains 95 pages of closely printed statistics. No. 331 has 55 similar pages, being devoted to "All Authorized Gas Undertakings in the United Kingdom Belonging to Local Authorities." Both papers are over the name of Mr. Francis J. S. Hopwood, who appears to have been the compiler, and a big job it must have been when one considers the immense number of figures and diversity of information to be found therein, as shown, for example, in the summary, as follows:

Table Showing the Total of the Local Authorities' and Companies' Returns.

	Number of Authorized Undertakings Included in Return.	Amount Authorized.	Paid up and Borrowed.	Receipts.	Expenditure.	No. of Cu. Ft. of Gas Made.	Tons of Coal Carbonized.	No. of Cu. Ft. of Gas Sold.	Length of Gas Mains in Miles.	No. of Consumers.	No. of Lamps Lighted.
Companies' return.....	454	£86,864,822	£74,977,378	£17,955,187	£14,537,797	97,386,618,553	8,580,365	89,685,208,319	17,032	2,048,359	326,209
Local authorities' return.	251	38,787,126	34,045,442	9,300,567	7,630,856	59,300,273,086	5,522,264	54,373,347,857	11,253	1,872,633	287,887
Total.....	705	125,651,948	109,022,820	27,255,754	22,168,653	156,686,891,639	14,102,629	144,058,556,176	28,285	3,920,992	614,096

Of the gas sold, 15,365,900,275 cubic feet was water gas, and 89,355 cubic feet was acetylene gas.

Referring to the companies alone, a "Comparative Table," embracing the 20 years, beginning with 1882, ending with 1901, and including both of these years, contains a few interesting figures. For example: In the first year named the gas sold was 45,484,910,194 cubic feet, while the sales in the last year are nearly double—viz., 89,685,208,319 cubic feet—but the mileage of mains did not increase in the same ratio; for while in 1882 there was no information upon the subject, 1883 shows 11,914¾ miles; which, in 1901, had increased to 17,032 miles. Water gas first appears in the returns in 1898, when 5,125,804,000 cubic feet of same was reported "sold." The writer, who was on England and on the Continent during said year, found then still considerable doubt existing in the minds of many of the leading engineers "on the other side" as to its practicability; and did considerable volunteer and unpaid-for missionary work then, on behalf of water gas, being suitably rewarded on his return to this country by being "jumped on" and roundly abused by at least one of those who have made considerable money out of the subsequent rapid increase in popularity of water gas. But, quoting Mr. Kipling, "That is another story."

While it took 20 years to about double the sales of gas *per se*, it did not take 4 years to more than double the quantity of water gas sold by the authorized companies; while the local authorities did nearly as well, but added acetylene gas to the list in 1900. Private companies seem to have steered clear of that to date.

In 1882 there were 148 local authorities and 352 private corporations supplying gas in the United Kingdom, which, in 1901, had increased to 251 local authority and 454 private corporation plants. Scotland appears to favor municipal ownership, for there we shall find 45 gas undertakings owned or operated on municipal account, and only 3 private companies. In Ireland there are 11 private and 8 municipal plants, while in England and Wales are to be found 198 plants operated by the municipal government and 440 private companies furnish gas. The acetylene gas noted previously is made and used by the Portsoy Gas Commissioners, Banffshire, Scotland, who report having used 11¼ tons of carbide, producing 103,040 cubic feet of gas, giving from to **25** to **30**-candle power; 65,931 cubic feet was sold to private consumers, of which there were 64; 23,424 cubic feet were used in public lamps, of which there are also 64; and 13,685 cubic feet was used at the works or is accounted for. They have about 4 miles of mains, and the plant cost about $70,000, which was borrowed at 3½ per cent. Benzol appears to be quite a favorite for coal gas enriching, scarcely for napthaline prevention, since they, as a rule, do not carry the fairly destructive heats which are so much in underserved (?) favor in our country—this last is from personal observation. In the "Returns" we find not only the smallest, but also the largest of these representatives of our industry. Who has not read of the great Beckton Works, which is only one of a number operated by that huge corporation or Company, "The Gas Light and Coke Company," of London. Said Company is the result of an amalgamation of 9 formerly independent companies which supplied gas in the city of London. The Company has 2,073 miles of street mains; supplies 49,806 street lamps and 373,330 consumers, all in the one city. During the year covered by this one report 22,639,033,000 cubic feet of gas were manufactured by it, and 21,160,142,000 cubic feet sold, the balance being used at the works or otherwise unaccounted for. To produce this gas 1,894,874 tons of coal were required; also, 12,225,294 gallons of petroleum and 430,652 gallons of gas naphtha. Next in importance we find the South Metropolitan Gas Company, also an amalgamation of 7 companies which formerly supplied gas in the city of London. This is the Company which so largely owes its success to the most famous of all living gas engineers, Sir George Livesey, whose kindly face and manner and whose sound professional advice and counsel will never be forgotten by anyone who has had the honor and good fortune to have met this real gentleman of the old school. Sir George Livesey is also largely interested in the management of the Crystal Palace District Gas Company, still another of the great London gas companies, and also as a Director, as we call it in this country, of the great Gas Light and Coke Company. He is *not a young man*, this grand old Nestor of the gas profession, but it is very doubtful that in the "young-men-crazed" contingent one could find a man of one-fourth of his ability by trying even "real hard." Experience, not merely youth, is what "goes" apparently very well elsewhere in the world, outside of these United States of America, where "45" is the danger line, for reasons the wisdom of which may become manifest too late for the benefit of those "whom it may concern" to know. At any rate rate, when looking over the column in which the interest or

dividends paid, and also the actual price for gas charged, are carefully scanned, it is plain that "the old boys" on the other side are not doing half-bad for either company or consumers. Few American companies, in fact none, do as well in that respect as a goodly number of the gas undertakings in the United Kingdom. What they might do, if they would only turn out "Experience" and put "New blood" at the helm, goodness only knows; and our English cousins do not seem to be anxious to find out either! The writer, a young man of 57, having crossed the "danger line" some years ago, trusts that the young readers of the JOURNAL will kindly make some allowance for him on that account, and at the same time not forget to "stay young" as long as possible, and they may live to see better times again before *they* reach the present *danger line*, almost upon some of them; or else, let us hope on the day when our financial Napoleons have reached the limit, which is bound to come very soon at present rate of progress, that awakening reason will remind proprietors that character and experience in conducting large interests are possibly of more real value than the impetuosity and hot headedness of youth, even though the latter is to be had often at figures that are small.

Returning to the report. Note what a quantity of material is required to supply this one city of London with artificial light and fuel in the shape of illuminating gas; and, mind you, electricity is employed also to a considerable extent, while soft coal fuel, in sufficient quantities to make the sun invisible at times, even on a bright day, is constantly used. Tons of gas coal numbering 3,436,360, and 16,989,893 gallons of oil, to produce 39,342,781,000 cubic feet of gas, are the official figures for 1 year—the one under review.

High Pressure Gas Incandescent Lighting.

[A paper read by MR. WILLIAM SUGG, of London, England, at the First Annual General Meeting of the Institution of Gas Engineers, London.]

At the meeting of the Gas Institute in June, 1901, the writer gave a paper on "High and Low Pressure Gas Incandescent Lighting," illustrated by drawings of the burners and the pressure increasing apparatus as it then was. Since that time, considerable improvements have been made in the system of lighting; and I propose in this paper shortly to describe these improvements:

Drawing No. 1 shows the original pressure increaser driven by hydraulic pressure, such as is used, among other places, at the Great Central Station, at Euston Station, and at several other railway stations. Drawing No. 2 shows the writer's improvements on No. 1 water engine.

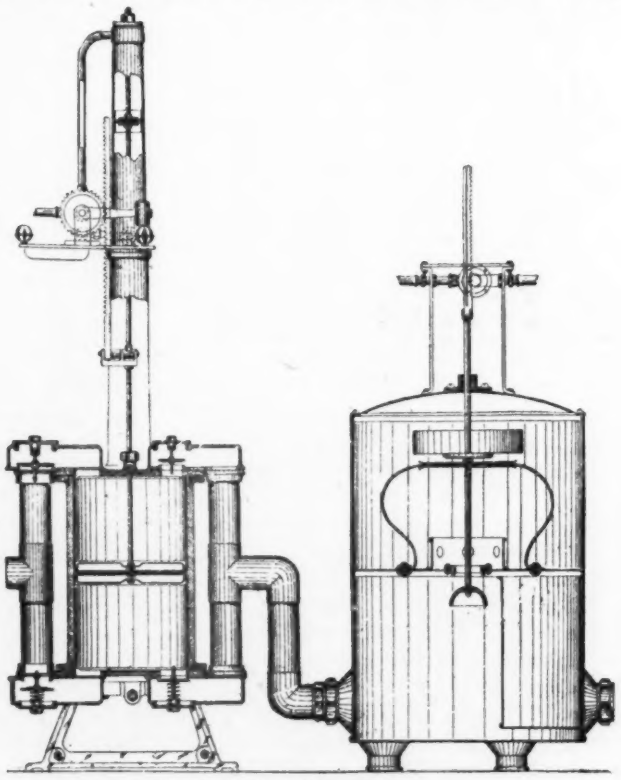


Fig. 1.—Hydraulic Pressure Increaser.

Since the meeting in 1901, the Tower Bridge, Blackfriars Bridge and London Bridge have been lighted by incandescent gas—the two former with high pressure, and the latter with low pressure; also Bristol Joint Station of the Great Western and Midland Railways, York Station of the North Eastern Railway, and a number of other railway stations, engineering factories, and lace factories, etc., with high pressure—the writer's improved water engine being used. Now these installations have necessitated a special arrangement both of burners, reflectors, and pressure increasing apparatus to satisfy the different requirements. For example, in engineering factories the vibration of the machinery was found very destructive to mantles, and, consequently, it became necessary to provide means by which this excessive vibration might be counteracted. This has been effectually done by means of the suspension light shown in drawing No. 3.

For many shops and mills where there was a nearly regular running shafting, some of the pressure increasers were arranged to be driven from the shafting, and a bye-pass arrangement was devised, so that when any of the lights were put out, the pressure was not increased, or when the number of lights was increased, according to the requirements, the pressure was not reduced. This is found to be a very economical way of raising the pressure; the only drawback to it being that if the machinery stopped, the light stopped also. In order to obviate this objection, the writer devised a new engine (see drawing No. 4), which would automatically supply all the burners in the factory with the proper quantity of high pressure gas required at any moment, and by which the inconvenience of the valves which were used in the first-mentioned engines sometimes sticking and chattering is done away. The engine regulates its speed by means of a simple form of governor as shown in drawing No. 5, so that it can supply from the one light to its full number of 300 or more 10-foot burners automatically. When all the lights are turned off, it stops.

The engine and the pump are both fixed upon one base plate; the two steam cylinders, working without valve slides or connecting rods, driving one crank common to the three cylinders. The crank is provided with a flywheel, so that the revolutions of the engine are kept perfectly steady. The valves, both of the engine and gas cylinders, are face valves provided with a center pin on which the cylinders move; and by means of the oscillation of the cylinder caused by the motion of the crank, the valves are opened and closed. Consequently they work with the smallest amount of friction. The pressure of both gas and steam tends to lift the cylinders, and thus reduce the friction on the valve surfaces. The action of the pressure increaser is silent. At the same time the valves, being under the cylinder, let out any condensed water from the steam which accumulates when the engines are working slowly or stop. The engine therefore starts itself whenever one or more lights are turned on, supplying the quantity of gas required without any attention. The requirements of some engineering shops and lace mills are such that it is not convenient to work off the boilers which drive the machinery of the mill; and so it has been found necessary to provide a separate engine, so that the lights are kept burning though the engine of the mill or workshop is stopped. This has been done by means of the engine just described. But for some of these places, it is better to use a gas engine, and this has been done by a combination of gas engine, with a pressure increaser designed by the writer, and shown in drawing No. 6.

In the case of the Tower Bridge and the Bristol Joint Station of the Great Western Railway, the water engines shown in drawing No. 2 were found to be very convenient, because they started and stopped themselves without attention, as does also the steam engine shown in drawing No. 4 regulating the quantity of gas to the exact amount required. These were replaced by gas engines as shown in drawing No. 6, because the pressure of the water was sometimes too much reduced by the turning on of a hose for washing down the roadway. The same kind of apparatus fixed at Portsmouth Dockyard was also affected by the filling of boat tanks and the washing down of the roadways. The same thing happens sometimes for a few moments by the filling of the engine tanks at railway stations; but the main difficulty which could not be overcome, was that the water companies, without notice, were in the habit occasionally of shutting off the water altogether. Then the station was put nearly in darkness, the burners having to burn on a pressure of not more than 1¼ inches of water. The cost of the water in the case of the Bristol Joint Station and other stations was charged at the high rate of 1s. per 1,000 gallons, and this very seriously affected the cost of lighting. But as soon as gas engines were adopted, the cost of raising the pressure up to 12 or 14 inches was immediately reduced to rather less than ¼d. per 1,000 cubic feet. It is found that a very small gas engine of 1-horse power is able to keep from 100 to 120 300-candle power burners going continuously.

There were two water engines used in the lighting of the Bristol Station—one for one side of the line, and the other for the other side. These are now replaced by two gas engines of about 1-horse power each.

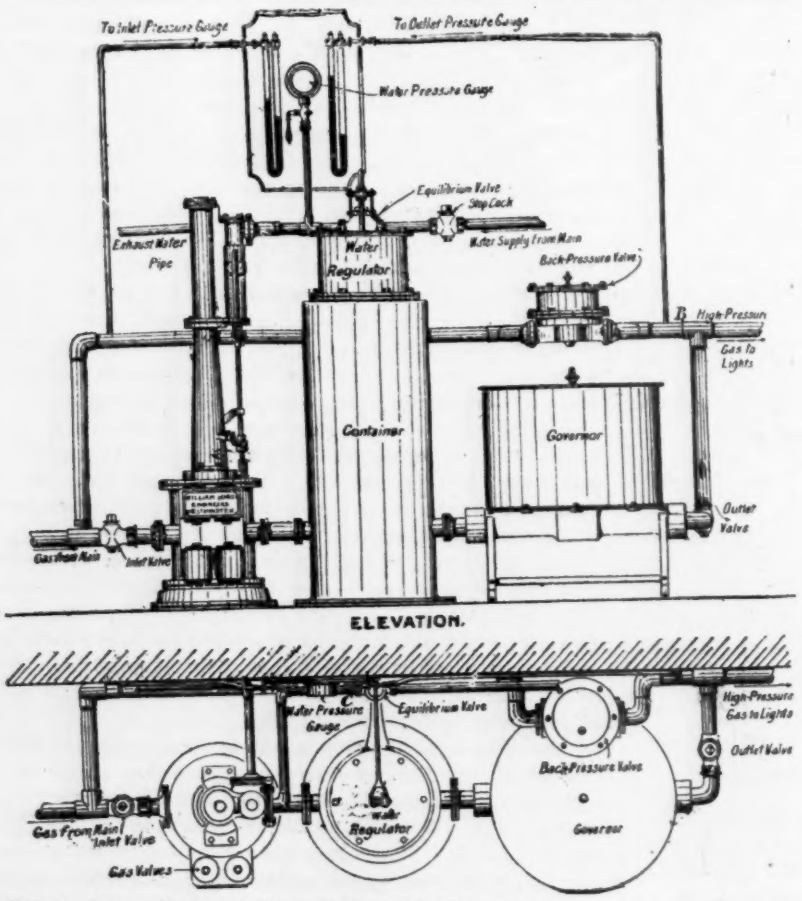


Fig. 2.—Pressure Increaser and Governor, worked by Water Pressure (from 20 to 30 pounds), Capable of Supplying Sixty 10-foot per hour Sugg's High Pressure Incandescent Gas Burners.

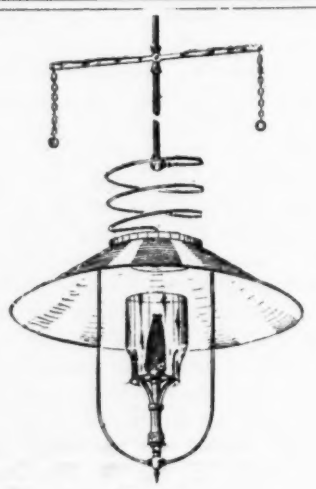


Fig. 3.

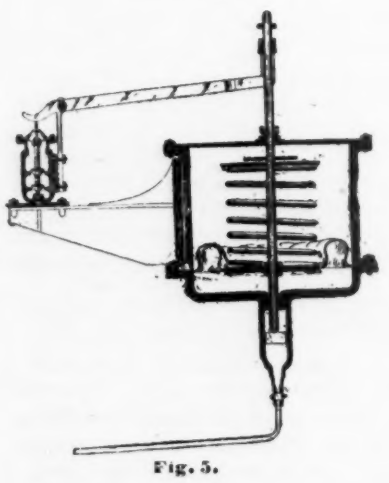


Fig. 5.

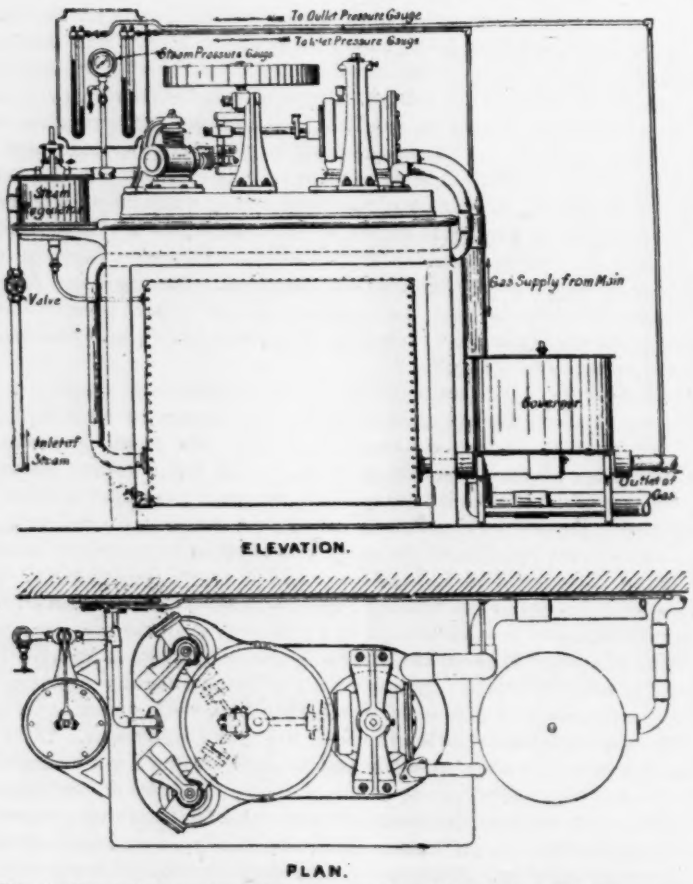


Fig. 4.—Sugg's Pressure Increasing Engine Worked by Steam, from 20 to 30 pounds pressure, Capable of Supplying Three Hundred 10-foot per hour High Pressure Incandescent Gas Burners.

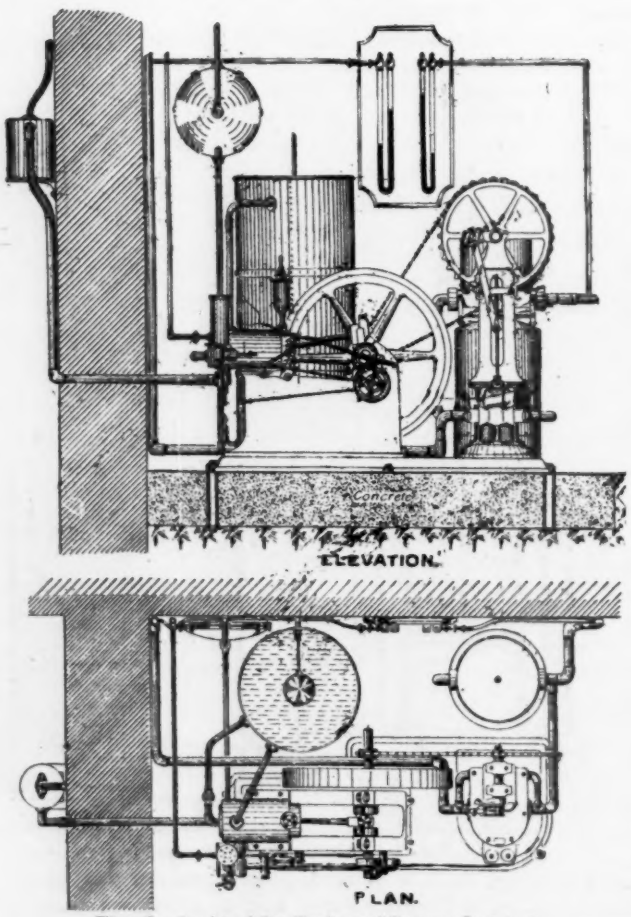


Fig. 6.—Combined Gas Engine and Pressure Increaser.

The mains are connected so that in case of any repairing or cleaning having to be done to the one engine, the other one is capable of lighting the whole station. Therefore, by means of either the steam or the gas engine pressure increaser, there is no danger of the system failing, as there would be with the water motors when the water companies suddenly shut off supply. Of course, the burners which are used for the high pressure lighting will also work on the low pressure; so that at midnight, for example, in places where they do not want so good a

light, or on railway platforms when there is no train in, the pressure increaser can be stopped, and the lights will burn on low pressure, giving about one-third of the light that they were giving on high pressure.

The pressure of the gas used on the Tower Bridge and Southwark Bridge is 10 inches, giving 10 feet of 14 candle gas per burner. At Blackfriars Bridge, which is supplied by the Gas Light and Coke Company, the gas is 16-candle power under the same pressure, with the same consumption of 10 cubic feet an hour for each burner. But by raising the pressure to 14 inches, which scarcely affects the cost of working the gas or steam engine, the illuminating power of each burner may be increased to 400 candles instead of 300 candles with an extra consumption of 2½ to 3 cubic feet per hour per burner (according to the quality of the gas); and this quantity adds about 100 candles to the volume of light—thus making an addition in illuminating power of 40 candles to the foot, produced by this small extra quantity. In some cases where pipes are old and may not stand the pressure of 10 or 14 inches, the illuminating power may be produced by putting the air under pressure instead of the gas, and leaving the gas to enter at the foot of the burner at the normal pressure supplied by the gas companies.

For this purpose, the author has devised a new burner, as shown in Drawing No. 7. It will be perceived that the gas comes into the burner by a central jet, taking in a certain quantity of air with it in the usual way with Bunsen burners. Around this annulus, a number of fine holes are pierced, exactly the same as those in the old Argand burner; and, therefore, the air, under a pressure of from 10 to 14 inches (or even more if required) is delivered into the supply tube by regularly spaced jets, and goes up round the column of gas and air brought in by the jet till it gets to the top of the burner. There the column of gas strikes against the underside of the top of the burner, and, spreading itself out, mixes with the air and comes out from the top of the burner perfectly mixed, producing the same illuminating power as when the gas is under pressure. With richer gases, it produces a much better result, because a larger quantity of air, and consequently more oxygen, can be mixed with the gas; and this is sufficient to produce as perfect a combustion as it does with the lower qualities of gas, with a proportionate gain of illuminating power.

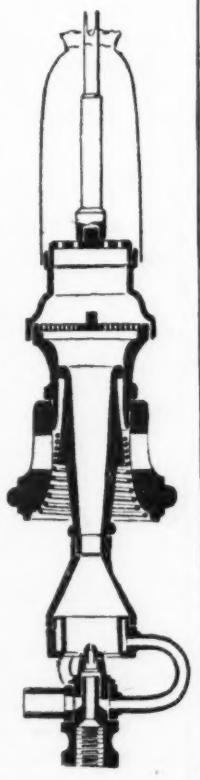


Fig. 7.

With such burners as these, we may look forward to making a great improvement in the illuminating power of high pressure burners supplied with rich coal gases. Under ordinary circumstances, it is difficult to get enough oxygen induced by the velocity of the jet to properly develop the illuminating power of these gases. But with this burner, an additional quantity of atmospheric air at any suitable pressurs, according to the quality of the gas, can be supplied so as to produce a perfect combustion of these rich gases, and thus considerably extend the means of employing high pressure gas, especially for harbor lights, etc.

Note on Carbonylferrocyanide in Coal Gas.

Mr. James F. Smith, writing in the *Gas World*, says: It is well known that carbonylferrocyanide occurs in the solutions obtained in the extraction of hydrocyanic acid from coal gas, when a solution of an alkali, or alkaline carbonate, with hydrate or carbonate of iron in suspension, is used for this purpose, as well as in the solutions obtained from spent oxide (which has been used for the purification of coal gas) by washing with an alkaline solution for the recovery of the prussian blue it may contain. The quantity of carbonylferrocyanide obtained in the solutions from the extraction plant generally amounts to from a slight trace to about 5 per cent. of the ferrocyanide present, while as much as 15 per cent. of the ferrocyanides obtained from a spent oxide was found to be in this form. Some time ago I commenced making experiments in order to trace its formation, with a view, if possible, of trying to prevent the loss of hydrocyanic acid in this way; and as the results I obtained were interesting, and I cannot find any published account of such experiments having been made, I venture to lay them before the readers of the *Gas World*.

This compound was first isolated by Ortlieb, at Croix Chemical Works. By fractional precipitation of the ferrocyanide from a solution, he obtained a mother liquor that gave a violet precipitate with ferric chloride. Müller investigated this substance, and found that its formula was $K_2FeCO(Cn)_5$, and from his experiments he was led to believe that it was potassium ferrocyanide, in which KCN was replaced by CO. He afterwards prepared the carbonyl compound by heating a solution of potassium ferrocyanide with carbonic oxide in sealed tubes to 130° C, at which temperature he found the reaction was complete in 48 hours. From Müller's work it would appear that this substance is formed in the extraction apparatus, though the temperature of this is never so high as that employed by him. But thinking that the reaction might possibly take place at the temperature of the extraction apparatus, I determined to try to prepare it by the action of carbonic oxide on a solution of potassium ferrocyanide at such temperatures as are usually found at the washer, and also by bringing the necessary constituents together in the presence of a solution of caustic soda with hydrate of iron in suspension. In this I was not successful. No carbonyl compound was formed when the carbonic oxide used in the experiments contained iron carbonyl.

These experiments indicate that the compound is not formed during the extraction of the hydrocyanic acid, but at some point before this. In order to get some idea of the place where it was formed, I tested the ammoniacal liquor from various parts of the works for this substance, but could not detect it in this from any part of the plant. It was present in every sample of spent oxide that was tested. In making further tests, it was decided to replace the mixture of caustic soda and hydrate of iron with a solution of dilute sulphuric acid, in order to remove any possibility of the carbonyl compound being formed during the testing of the gas with the above mixture, and to do away with the tedious operations of separating the two compounds from one another before detection of the carbonyl compound. It was thought that on passing the gas through the acid the carbonyl compound would be retained by it, if it was present, already formed, in the gas, which I was led to believe would be the case from the unsuccessful attempts to prepare it by the experiments described, and by experiments on the action of CO on prussian blue.

A small wash bottle was fitted with a double-bored cork to carry the inlet and outlet tubes in the usual manner, and charged with dilute sulphuric acid (1 part of acid in 3 parts of water). The gas leaving the clean water scrubber was passed through this solution for some time. After it was thought that sufficient gas had passed through it, the solution was emptied into a small beaker and boiled, when it was noticed that the solution turned at first to a reddish purple color, and after some time a precipitate was formed, which was allowed to stand for 24 hours, after which it was filtered off and tested, when it was found to be an iron compound of carbonylferrocyanide. The filtrate was then tested for ammonia, which was found to be present. It was noticed that when the precipitate obtained from the acid solution was allowed to stand on the filter paper in contact with the air it changed from the reddish purple to a violet color. The gas was then tested in the same way up to the hydraulic main, when it was found that the gas contained this substance up to this point. Every batch of acid used was boiled for some time in order to remove any doubt that the acid contained any substance that would act in the same way as the carbonyl compound.

As these experiments point to the fact that the carbonyl compound was present in the gas as ammonium carbonylferrocyanide, it was thought necessary to test the spent oxide for ammonia and carbonylferrocyanide, in order to get the proportions in which they were combined; and it was found that they were present in nearly the exact quantities required by the formula $(NH_4)_2FeCO(CN)_5$, though in some cases the ammonia was in slight excess of the formula, although ammonia (as indicated by litmus paper) had not been allowed to pass the clean water scrubber. To confirm the above I made various experiments to prepare the substance synthetically, and found that it could be prepared by passing a mixture of ammonia, hydrocyanic acid and carbonic oxide with water vapor, or ammonia, hydrocyanic acid, and coal gas over metallic iron heated to between 100° and 140° C.

During these experiments I found that it was necessary to have ammonia present, or no carbonylferrocyanide was formed, which, I think, points conclusively to the fact that the volatile carbonlferrocyanide existing in coal gas is the ammonium one, and therefore its formation cannot be prevented in the recovery of the hydrocyanic acid as a ferrocyanide.

It may be interesting to note that iron due to the iron carbonyl in the gas could be detected in the acid solution before and after boiling by means of ammonium sulphocyanide reaction. The iron present in the solution did not appear to cause the precipitation of the carbonylferrocy-

anide, but this was caused by the sulphuric acid, as HCn was always given off on boiling, or on standing for several days in the cold. This, I think, points to the fact that iron carbonyl is only mechanically dissolved by the acid.

Notes on Steam Driven and Gas Driven Blowing Engines.

[A paper read by Mr. Tom Westgate at the Engineering Conference, Institution of Civil Engineers, London.]

It was considered that a short paper upon the subject of steam driven and gas driven blowing engines would be of interest to the Conference, and I therefore accepted the invitation to write a few notes which will form a basis for discussion.

It is, perhaps, not necessary to discuss the older types of steam blowing engines, except to remark that they must have been very suitable for the work to be done, judging from the few changes that have been made, and the long time they have worked. But the steam blowing engines which have done such good work were found a few years ago to be unsuitable for the harder work and higher blast pressures required, the development first taking place in the United States, where ironmasters had a great advantage in being able to put down entirely new plant, and therefore could adopt the experience of other countries. These developments followed in Europe, commencing about 10 to 15 years ago, when some of the more progressive ironmasters began to put down engines of much heavier design, having compound steam cylinders and capable of running faster and blowing at higher pressure, the type of engine used being, I think, fairly illustrated by engines built by my firm—that is, twin vertical engines having compound steam cylinders, 40-inch and 84-inch in diameter by 60-inch stroke, exhausting into a separate condenser, the boiler pressure being 150 pounds per square inch. As the engines had to run in ordinary work at 50 revolutions a minute, and to blow up to 30 pounds per squre inch, it was decided to equip the air cylinders, which are 84 inches in diameter and 60 inches stroke, with the sliding valves made by the Southwark Foundry and Machine Company, of Philadelphia. These valves proved to be a great success, as the clearance is reduced to 1½ per cent ; the inlet valves are worked by mechanical gear from the shaft, and the outlet valves are closed mechanically, but are reopened automatically by the air pressure, the arrangement being such that, when the pressure in the cylinder and in the mains is balanced, the valves are slightly lifted from the face, and are pushed open by a controlling cylinder actuated by the air pressure, so that the arrangement is not only automatic, but practically frictionless.

I understand that a set of triple expansion vertical blowing engines with three cranks has been working for some time in West Cumberland, with satisfactory results; but, as I have not seen the engines, I am not able to do more than refer to them.

The next step which I took in the construction of steam blowing engines was to adopt the so-called quarter crank arrangement, which was developed by the Southwark Foundry and Machine Company of Philadelphia. With the increasing piston speeds, and particularly the increasing blast pressures, to be dealt with, it became evident that some alteration would have to be made in the ordinary design of steam blowing engines. With the usual plan of having the steam and air cylinders in line and working upon the same rod, it is found that serious shocks occur at each end of the stroke when using high pressure steam and blowing against high pressures, because whilst the steam pressure must be admitted into the cylinder at a very early part of the stroke, the full resistance does not accumulate in the air cylinder until a much later part of the stroke. Although this difficulty exists in a smaller degree in all ordinary blowing engines, it was not found to be serious with low speeds and low pressures, but it was found to result in frequent accidents when modern requirements were being fulfilled, and the quarter crank engine was therefore designed to overcome the difficulties. The arrangement consists of an ordinary inverted vertical steam engine acting upon a crankshaft and flywheel. Upon the opposite end of the crankshaft from the flywheel is fitted another crank, which, by means of the usual gear, works an inverted vertical blowing cylinder placed side by side with the steam cylinder. It will be understood that the cranks can be placed at such an angle that the shocks referred to can be avoided, and that this type of engine can therefore be run at much higher speeds, blowing at high pressure with perfect smoothness and safety; indeed, these engines can be run so much faster that, although at first sight expensive, they are not much more costly than an ordinary vertical engine when the quantity of air discharged is considered. It will also be observed that the high pressure and low pressure sides of these engines are quite separate, being connected only by the exhaust from the high pressure to the low pressure cylinder, which passes through a reheater, so that if either half of the engine is laid off for repairs or by accident, the other half can be kept going. The engines are fitted with the sliding valves already referred to. These quarter crank engines have been largely adopted in America and in England. My firm have a number of sets in hand, and we hope to be ready to show a set in work at Barrow when the Iron and Steel Institute meet there in September.

It recently became evident that blowing-engines worked with gas are particularly suitable for blast furnace work. I therefore investigated the matter fully and carefully, and finally made arrangements with the Société Anonyme John Cockerill, of Seraing, to build gas driven blowing engines to their designs and under their patents, and I shall speak more particularly of the Cockerill engine as being the one I understand best. No doubt others will be able to give us information as to the Körting, Oechelhäeuser, Crossley Premier, and other gas blowing engines, the object of this paper being to invite discussion on these matters.

The Cockerill Company were the pioneers in the making and using of large-size blowing engines to work with blast furnace gas. Their engines work upon the Otto cycle, and for blowing work have usually one single-acting cylinder. We are now developing the same arrangement, but with double-acting gas cylinders, for blowing work, but more particularly for dynamo work, which does not come within the scope of this paper.

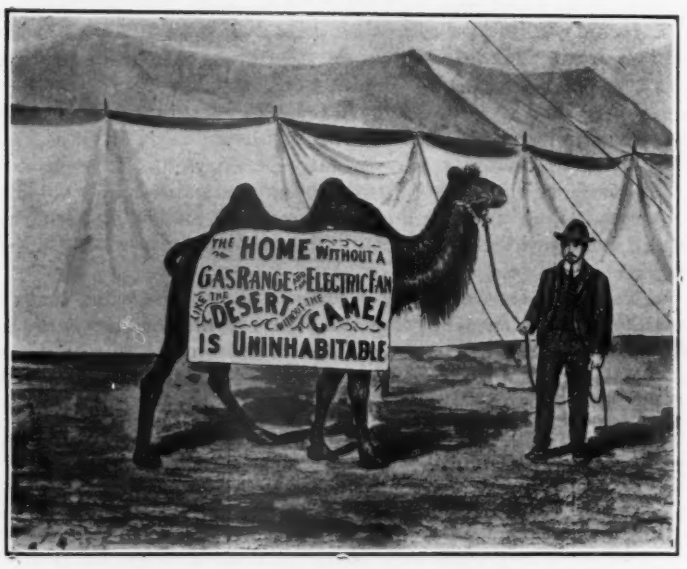
The air cylinder of such an engine is fitted with a large number of small circular valves. These have proved to give very good results at speeds up to 80 and 90 revolutions per minute, but I am now building two of these engines fitted with the Southwark sliding valves, from which I expect still better results, as I think the sliding valve mechanically controlled will prove to be more suitable for the high speeds at which gas engines must run to be economical. The engine has a single-acting gas cylinder 51½ in. in diameter by 55 in. stroke, a blowing cylinder 72 in. in diameter by 55 in. stroke, and is to work at 80 revolutions per minute.

Having now spoken of gas and steam blowing engines individually, we will pass on to what is at present the most important and most interesting part of the question—viz., as to whether steam driven or gas driven blowing engines are more economical and more suitable for the work to be done, and I have no hesitation in saying that, speaking generally, in my opinion the gas engine is more suitable, providing always there is a ready means of using the gas which will be saved by using the gas engine. If an entirely new steel works with blast furnaces, etc., is to be put down, undoubtedly the whole of the blowing power for the furnaces should be derived from gas; and if the gas be cleaned, as it should be for the stoves, it will be found that there is a considerable surplus, which can be sent to the steel works' boilers or used for gas engines to generate electricity; but if a blast-furnace plant is to be erected without steel or other works, and there are no other outlets for surplus power, there is probably not much difference between using steam driven or gas driven blowing engines; but in these days of universal application of electricity, it is very unlikely that a blast furnace plant would be erected where surplus power could not profitably be used. I think the question between steam driven and gas driven blowing engines is more open for consideration where existing works, requiring increased blowing power, have to be dealt with, and then it would turn largely upon a question of existing boilers, condensers, etc.; if these are ample and are in good condition, and there is no easily found means of using surplus power, many people would prefer to put down steam blowing engines; but if a condenser and new boilers have to be put down, it would appear to be wiser, instead of using steam blowing engines, to adopt gas driven engines. To consider the whole question, it may safely be assumed that the quantity of gas used by gas driven engines would be about one-fourth that required to raise steam in good boilers for steam driven blowing engines. It may also be considered that, broadly, the cost of a steam driven blowing engine of modern construction—say, a compound or triple expansion engine with Corliss valves and mechanically controlled air valves, together with the necessary boilers, condensing plant, etc.—will be somewhat more than that of gas driven blowing engines, with the necessary gas cleaning plant, for a given amount of work to be done. It may also be assumed that the consumption of oil for a gas engine will be slightly greater than for a slower running steam engine, although not much, this matter of oil consumption having been greatly exaggerated; and also that the consumption of water for a gas engine will be less than for a steam engine.

A Novel Advertisement.

We are indebted to Mr. R. M. Searle, of the Westchester Lighting Company, Mount Vernon, N. Y., for the illustrations herewith show-

"Obverse."



"Reverse."

ing the use that the Company made of a "real live camel," during a circus parade in Mount Vernon, as a means of showing that which the Company had for sale. The "ad." attracted great attention.

[Concluded from Page 89.]

The Making of Specifications.

[Address of DR. C. B. DUDLEY, Altoona, Pa., Pres. Am. Society for Testing Materials.]

Re-tests.—Another closely related point is the question of re-tests. A shipment of material has been received, sampled in the regular way and tested, and the material does not stand test. It not infrequently happens that the producer asks for another test, with the hope and expectation that this test will show that the material meets the requirements. No small amounts of correspondence and personal interviews have been expended over this matter. Our general position upon this subject has been to decline re-tests, the theory being that the specification was not drawn for the purpose of making it easy for irregular, and we may say possibly carelessly made, material to be accepted. If a second test is made which does not meet requirements, it is obvious that the consumer would naturally want to make a third test and see which one the third test sustained, and we believe many specifications are drawn with such provisions. We cannot but think that this is bad practice, and that it is infinitely better to make the limits of the specification wide enough when they are first drawn, so that they will cover all the uncertainties in manufacture, except carelessness, bad judgment, or an attempt to sell an inferior product at the price of a good one. It is very gratifying to be able to state that with the large number of specifications enforced on the Pennsylvania Railroad, where each shipment is now examined and has been for quite a period of time, the number of rejected shipments which fail to meet the specifications varies from 1.50 to 2.50 per cent., possibly sometimes a little higher. Usually the rejections are characteristic of the new specifications—that is to say, when a specification has been out long enough so that manufacturers have had a chance to adapt themselves to its requirements, it is very rare that we have rejections.

Rejected Shipments.—Another point may be worth a few words—namely, is it possible to so draw a specification that material which has once been rejected will not be offered a second time? There is perhaps no point connected with the specifications which is more difficult to handle than this one. It is recognized that the putting of marks on rejected shipments, as is the custom in government work, deteriorates the quality of the product, and of course adds a good deal to the cost, since the manufacturer must requite himself for the material so condemned. When materials bear serial numbers placed upon them for his own purpose by the manufacturer the problem is less difficult, but for the mass of products which are made the subjects of specifications such identifying marks are not available. It is perhaps fair to say that we have had shipments of rejected material returned to us, and have a second time rejected them on the second sample. Our feeling is that where there is a clause in the specification that the manufacturer must pay return freight, very few reputable people at least will run the risk of a second rejection by returning material already once condemned. Moreover, it is not very difficult to so mark rejected material with a private obscure identification mark that it can be recognized if it is returned, and, as has been stated by the purchasing agent, it is easy to meet such cases, where the matter is free from doubt, by withholding orders from those who indulge in such practice. Our experience has been that the commercial world desires rather to do a straightforward, open, honest business in a straightforward, honest way, and that where the specifications are reasonable and the processes fair there will be very little difficulty on this score.

The Attitude of Producers to Specifications.—Two points more: First, how do specifications affect the business of producers, and, second, what is the effect of specifications on the prices of materials? Upon the first of these points let us say we are well aware that many producers object to specifications on the ground that they are annoying and harassing, and really serve no good purpose. On the other hand, we are able to say that some manufacturers have asked that specifications be prepared, and one large producer indeed told us in conversation that the more difficult the specification the better they liked it, on the ground that it limited the competition which they would have in producing the product. There is a point here which is perhaps worth a few words. Let us suppose that an honest manufacturer is making a good product. He understands his business and has good facilities and is turning out an excellent article. When he comes to sales he is called upon to meet in competition, let us assume, those who are not equally well equipped, and who in order to secure a market must offer lower prices. In order to recoup for this diminution in price he, of course, must make an inferior product. So long, therefore, as the consumer buys on price alone, and without any specification or examination of shipments, the honest, competent manufacturer is at a disadvantage. On the other hand, if there is a good, workable specification in force and each shipment is examined, the unfair competition of the inferior manufacturer is entirely eliminated. We have many times stated in conversation with manufacturers that in our judgment those who are doing a legitimate, straightforward, honest business should be the strongest friends that specifications have, and it is gratifying to be able to state that many manufacturers of commercial products look at the matter in this light.

The Effect of Specifications on Prices.—Many consumers fear that if they enforce specifications the price of the product will seriously increase. This seems a legitimate fear, and it is a fair question if the facts are as they seem to be whether the value of the material according to the specifications is equal to the increased cost. It is gratifying to be able to state that experience indicates that after a specification has passed what may be called the "experimental stage" and is working smoothly prices show a strong tendency to drop below the figures prevailing at the time the specification was issued. This seems to be due to two or three causes: 1. The manufacturers are all competing on the same quality of product, hence genuine competition prevails; 2, the specification describing what may be called a "stable commodity," for which there is a set demand, slack time at the works may be employed in making this product in advance of orders, thus employing facilities to the best advantage; 3, the constituents entering into a specification material for which there is a steady demand can without fear of loss

be purchased in large lots and at the best stage of the market, thus securing the lowest prices. Whatever the causes, the effects on not a few of the materials are as stated. Of course, supply and demand are important elements in prices, and there will undoubtedly be fluctuation, but it will not be difficult to give instances in which this general tendency of specifications is clearly seen.

Conclusions.—Other points may be discussed or touched upon more or less at length, but I fear that I have already taken too much of your time. In order that what has preceded may be put into fairly concrete form I beg to submit the following conclusions, as in a sense summing up what has already been said and as putting on record our ideas on the various points in the making of specifications for various materials:

1. A specification for material should contain the fewest possible restrictions consistent with obtaining the material desired.

2. The service which the material is to perform, in connection with reasonably feasible possibilities in its manufacture, should determine the limitations of a specification.

3. All parties whose interests are affected by a specification should have a voice in its preparation.

4. The one who finally puts the wording of the specification into shape should avoid making it a place to show how much he knows, as well as a mental attitude of favor or antagonism to any of the parties affected by it.

5. Excessively severe limitations in a specification are suicidal. They lead to constant demands for concessions, which must be made if work is to be kept going, or to more or less successful efforts at evasion. Better a few moderate requirements rigidly enforced than a mass of excessive limitations which are difficult of enforcement, and which lead to constant friction and sometimes to deception.

6. There is no real reason why a specification should not contain limitations derived from any source of knowledge. If the limitations shown by physical test are sufficient to define the necessary qualities of the material, and this test is simplest and easiest made, the specification may reasonably be confined to this. If a chemical analysis or a microscopic examination, or a statement of the method of manufacture, or information from all four, or even other sources, are found useful or valuable in defining limitations or in deciding upon the quality of material furnished, there is no legitimate reason why such information should not appear in the specifications. Neither the producer nor the consumer has a right to arrogate to himself the exclusive right to use information from any source.

7. Proprietary articles and commercial products made by processes under the control of the manufacturer cannot, from the nature of the case, be made the subject of specifications. The very idea of a specification involves the existence of a mass of common knowledge in regard to any material, which knowledge is more or less available to both producer and consumer. If the manufacturer or producer has opportunities which are not available to the consumer, of knowing how the variation of certain constituents in his product will affect that product during manufacture, so also does the consumer, if he is philosophic and is a student, have opportunities not available to the producer of knowing how the same variation of constituents in the product will effect that product in service, and it is only by the two working together and combining the special knowledge which each has that a really valuable specification can be made.

8. A complete workable specification should contain the information needed by all those who must necessarily use it in obtaining the material desired. On railroads this may involve the purchasing agent, the manufacturer, the inspector, the engineer of tests, the chemist and those who use the material. A general specification may be limited in describing the properties of the material, the method of sampling, the amount covered by one sample and such description of the tests as will prevent doubt or ambiguity.

9. Where methods of testing or analysis or inspection are well known and understood it is sufficient if the specification simply refers to them. Where new or unusual tests are required, or where different well-known methods give different results, it is essential to embody in the specification sufficient description to prevent doubt or ambiguity.

10. The sample for test representing a shipment of material should always be taken at random by a representative of the consumer.

11. The amount of material represented by one sample can best be decided by the nature of the material, its importance and its probable uniformity, as affected by its method of manufacture. No universal rule can be given.

12. The purchaser has a right to assume that every bit of the material making up a shipment meets the requirements of the specification, since this is what he contracted for and expects to pay for. It should make very little difference, therefore, what part of the shipment the sample comes from, or how it is taken. Average samples made up of a number of sub-samples, are only excusable when the limits of the specification are so narrow that they do not cover the ordinary irregularities of good practice in manufacture.

13. Re-tests of material that has once failed should only be asked for under extraordinary conditions and should be granted even more rarely than they are asked for, errors in the tests of course excepted.

14. Simple fairness requires that when it is desired that material once fairly rejected should nevertheless be used, some concession in price should be made.

15. Where commercial transactions are between honorable people there is no real necessity of marking rejected material to prevent its being offered a second time. If it has failed once it will probably fail a second time, and if return freight is rigidly collected on returned shipments the risk of loss is greater than most shippers will care to incur. Moreover, it is so easy for the consumer to put an inconspicuous private mark on rejected material that it is believed few will care to incur the probable loss of business that will result from the detection of an effort to dispose of rejected shipment by offering it a second time.

16. All specifications in actual practical daily use need revision from from time to time, as new information is obtained, due to progress in knowledge, changes in methods of manufacture and changes in the use of materials. A new specification that is one for a material which has hitherto been bought on the reputation of the makers and without any examination as to quality, will be fortunate if it does not require revision in from 6 to 10 months after it is first issued.

17. In the enforcement of specifications it is undoubtedly a breach of contract legitimately leading to a rejection if the specified tests give results not wholly within the limits, and this is espectally true if the limits are reasonably wide. But it must be remembered that no tests give the absolute truth, and where the results are near, but just outside of the limit, the material may actually be all right. It seems to us better, therefore, to allow a small margin from the actual published limit, equal to the probable limit of error in the method of testing employed, and allow for this margin in the original limits when the specifications are drawn.

18. Many producers object to specifications on the ground that they are annoying and harassing and really serve no good purpose. It is to be feared that the complaint is just in cases of many unwisely drawn specifications. But it should be remembered that a good reasonable specification, carefully worked out as the result of the combined effort of both producer and consumer, and which is rigidly enforced, is the best possible protection which the honest manufacturer can have against unfair competition.

19. Many consumers fear the effect of specifications on prices. Experience seems to indicate that after a specification has passed what may be called the experimental stage, and is working smoothly, prices show a strong tendency to drop below figures prevailing before the specification was issued.

20. A complete workable specification for material represents a very high order of work. It should combine within itself the harmonized antagonistic interests of both the producer and the consumer, it should have the fewest possible requirements consistent with securing satisfactory material, should be so comprehensive as to leave no chance for ambiguity or doubt, and above all should embody within itself the results of the latest and best studies of the properties of the material which it covers.

The Training of the High Tension Engineer.

By Mr. P. M. Lincoln.

There are two schools in which the electrical engineer *may* receive his training, but only one in which he *must* receive a course before he can be called a high tension engineer. Those things which are learned in the schools equipped with professors and laboratories and mathematical text books must be supplemented by the things which can be learned only in the school of experience. These two schools are quite different in method. The college instructs in theory and in those methods of doing things which have become standard by universal adoption. The college teaches positive knowledge. In the school of experience, on the other hand, one is more apt to learn how not to do it, and by the elimination of the unsuccessful, arrive at the goal of success. The knowledge gained by experience is more often negative.

Put to the fresh college graduate the problem of the amount of distance to be left between the conductors of a high tension transmission line. His answer will involve most likely the jumping distance of the voltage to be used, the length of span, the sag, and perhaps a liberal factor of safety. It is experience only that will show that his premises are wrong and that the equation to determine spacing of high tension

wires depends very little on the voltages to be carried and almost entirely on such things as the average length and ohmic resistance of cats, the spread of wings of owls, cranes and eagles, and the average length of scrap bailing wire, together with the strength of the average small boy's throwing arm.

The college graduate enters practical work invariably feeling that the greatest danger of his work lies in his liability of receiving a shock from the high tension conductors. Not until he has had experience with accidents of an electrical nature does he learn that it is the danger of being burned that he has to fear more than the danger of shock. My own experience, and I think it will be checked by the large majority of those in a position to know, has been that the number of electrical accidents in which the victim has been injured by burning is incomparably greater than the number from shock.

The graduate has learned how to make accurate measurements of power. He finds after he has been "up against it" that it is easier to measure power accurately than it is to persuade the customer that his power is being accurately measured.

The man fresh from the college laboratory enters his practical duties with the idea that rubber is one of the best insulators that exists. It is not until he has seen rubber insulation break down in the most unaccountable manner that he finds that rubber as a high tension insulator is extremely treacherous. The deterioration of rubber insulation is probably due to chemical reactions in the rubber induced by the brush discharge, which are in turn caused by the high voltage of the conductor.

The newly made graduate usually has a high opinion of efficiency and can calculate the economy of a transmission to an excessively small fraction. When he becomes responsible for the operation of a transmission line, however, it does not take him long to find out that efficiency is a vanishing quantity when compared to continuity of operation, and that economy is not to be considered as being in the same class as good service.

The technical graduate, in short, may have knowledge aplenty, but his wisdom is to come.

It is farthest from my thoughts to cast any slur upon the technical graduate. I look back upon my own course in electrical engineering and I feel that it is the most valuable asset I ever possessed. The technical course is the best of foundations, but it is only a foundation. The end of the college course is rightly called "commencement." The great advantage of the technical education is that it gives the man proper equipment for overcoming the difficulties with which his experience is bound to bring him into contact. It gives him, as nothing else will, the power of initiative—that most valuable quality that a high tension engineer can possess. There is nothing like the college education to equip a man for making every accident a lesson in "how not to do it," and every failure a stepping stone to success.

Take, for instance, the recent accident to the Niagara plant, in which a fire destroyed the cables on the bridge connecting the power house with the transformer house. The lesson to be drawn from this accident—so plain that he who runs may read—is that where many cables are run together, extreme precaution should be taken to protect against danger of fire. Before the occurence of this fire there was little suspicion that the insulation of cables when lead-covered or protected by fireproof braid—as was the case at Niagara—is sufficient to maintain so fierce a blaze without the aid of some other combustible beside the insulation. One accident of this kind should suffice, not only for the Niagara Falls people, but also for any others who have occasion to run many cables together.

The art of long distance electric transmission as it exists to-day is the result of the accumulated experience of all those who have had to do with transmission work. And the process of accumulation is still going on. Those men who to-day are designing and operating transmission plants are the moulders of the art. Their expedients for improving service or reliability or for cheapening cost are noted, and when successful have their influence on future installations.

The experiences of to-day are incorporated into the text books of to-morrow. But, although the result of experience may be taught to the college student—allowing always for a considerable angle of lag—the college curriculum can never become the substitute for the school of experience.

The high tension engineer no less than any man in any other department of human endeavor may find in failure the way to better things.

It was Roosevelt, the strenuous, who gave expression to the sentiment that absence of failure accompanied only lack of effort. "The uses of adversity are sweet," and the engineer may well heed the words that Shakespeare puts into the mouth of the Duke, who, exiled to the forest of Arden, finds "tongues in trees, books in running brooks, sermons in stones, and good in everything."

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, July 10th, 1903.

Ugly Lamp Posts and the Imitative Instinct.—A Slot Meter Question.—The Late Mr. William Foulis.

The "Magazine of Art" does not appear to be very highly impressed with the abilities of the authorities responsible for the design of our public and domestic buildings, or may be doubtful whether anything of the kind even exists. As much may be gathered from the remarks made upon London architecture in a recent issue, and which include criticisms of railings, balconies and last, but not least, lamp posts. And the author traces the evolution of the lamp post from the cannon discarded as obsolete or useless after the Napoleonic wars. They were largely adopted for use as corner posts in garrison towns, the bore being plugged with oak to keep out rain and refuse, and the emerging end of the plug shaped in hemispherical form to represent the issue of a cannon ball. Later on these real cannon were superseded by imitation iron castings, half-cannon ball included, and many of these may be seen in our principal thoroughfares, squares and crossings. These were simply adopted as lamp posts by the addition of a stem, or elongation of the plug to the height required to carry the lantern. I don't care to argue whether it is cheaper or easier to imitate rather than to originate, but a great deal might be written on the subject of ignorant imitation as applied to our special industry. By ignorant imitation I mean simply copying or duplicating a design, not on account of its merits, but because it happens to be the first that comes to hand. It is not that our country does not contain or cannot produce designers capable of equaling the lamp columns in evidence in France or Germany, but simply that their services are not called into requisition. If a set of lamp posts are wanted for a new street, the probability is that tenders are obtained by the medium of advertisement, and decided upon the merits, or otherwise, of cheapness. A course that effectually bars out the better class of artistic merit, which, as a rule, does not lay itself out for competitive tendering. The result is that the man who has the shrewdness to botch up a pattern out of an old cannon or anything else that happens to lay handy, stands a better chance than the one who works out an original and appropriate design, which means entirely new patterns. The common lamp post finds its prototype, not only in regard to many designs of gasfittings, but also to gas work plant generally. We see brackets or pendants for gas or for electricity, in which ornamental designs based on the oil reservoir or the grease cup under the light are maintained, and the chains as originally used for suspending lamps and candelabra. And the point can be carried closer home, to things for which gas engineers are more directly responsible. They cannot be held chargeable for ignorant imitation in lamp posts or gasfittings; but take a walk round any gas works, and sufficient examples will be found amongst the retort fittings, the condensing and purifying apparatus and the gasholders, to show that those responsible for the design of new appliances will do well to consider the utility of every detail. Perhaps, in this case also, it is sometimes a question of the survival of the *cheapest*, tenders being solicited and decided on the merits of £ s. d. alone, while the technical staff are barely equal to carrying on the daily routine, and have no time or opportunity to entertain questions of improvement, and, I might add, no encouragement to do so.

It is remarkable, considering the extent to which the slot or automatic meter has been adopted, that it has figured so little in the law courts. Many who turned to it with a certain amount of prejudice, as likely to lead to loss or dispute and who took care to protect themselves as far as possible by carefully drawn agreements, are surprised to find how smoothly the thing works in practice, and that a disagreement of any kind is much less common in the slot than in the ordinary department. I have had occasion to refer to one or two cases as being of a nature that admitted of settlement outside the court, and a case just decided at a county assize appears to be of a similar nature. The facts were not disputed. The wife of a consumer who had a slot meter fixed subject to the usual signed agreement happened, as ladies not unfrequently are, to be short of ready money, and applied to a neighbor for a loan, And the neighbor, who had possibly been there before, appears to have suggested resorting to the cash box of the slot meter and obligingly showed her how to pick the lock. The inspector cleared the box in November.

Three months later it was passed over as no one was at home when he called, and in May it was found that nearly the whole of the money had been removed. The woman admitted having had the money and was prepared to refund it, but the gas company decided to proceed on a criminal charge of theft. The defense to the charge was what might naturally be expected. It was to the effect that in order to maintain the indictment the company must be either the owners or bailors of the money. But the meter was supplied under a signed agreement, one of the clauses of which ran thus: "I also undertake to hold myself liable for all gas registered by the index of the meter." It was contended that the slot was a new mechanical arrangement, by which the money was retained pending the visit of the collector, and in the event of any deficiency being found, the proper course was a civil action for recovery of the debt. The agreement further stipulated that the consumer was responsible for damage other than reasonable wear and tear. The Court was unanimously of opinion that the charge of larceny could not be maintained.

In the face of the undertaking required from and given by the consumer, no other result could be expected, and the gas company were simply hoisted by their own petard. It is very smart to have a guarantee not only against money due for gas, but also against damage, but as frequently proved, smart agreements are two-edged. Another objectionable feature in this case was that the box was left for six months without being cleared. Unless arrangements are made to clear the boxes as soon as any reasonable sum accumulates, a direct temptation is offered not only to the actually dishonest, but to unthrifty borrowing people who occasionally find themselves in a tight place for money. Apart from that, it appears that a considerable sum, something over a sovereign, had been laying in the box for three months or so. Apply this to 1,000 or perhaps 10,000 meters and it is obvious that a considerable sum was laying doing nothing, which, apart from any question of security, might have been collected and put out at 2 or 2½ per cent. interest, if not otherwise required. In most districts, for this reason alone it pays to clear the boxes twice a quarter or eight times a year. When this is done the longest term of credit is 6 weeks and the average 3, a marked advantage as compared with the quarterly account usually paid 6 weeks or 2 months after face date, representing our average credit of over 3 months. It should be clearly laid down where the responsibility of the consumer ends and that of the company begins. The above decision appears to show that, subject to the signed agreement, the turning point is the visit of the collector and that the previous placing of money in the slot is a mere incident. Evidently it was not contemplated that the agreement might be used as a defense against the consequences of wilfully tampering with the lock and removing money from the box after it had been paid in. A great deal can be said in favor of considering the insertion of the coin to be payment, and a full discharge of liability, and in any case if the company choose to let the coin lie for 6 months before collecting, it is scarcely fair to hold the consumer liable.

Mr. William Foulis, the Gas Engineer to the Corporation of Glasgow, died on the 29th ult., after only two days' illness, at the age of 65, and while still under full harness, and the sad event signifies the removal of one of the foremost figures in the British gas industry, which would not occupy the important position it holds to-day, without the aid of workers who, like the deceased, combine the capabilities of competent, commercial management and the utilization of modern science. Unfortunately for Glasgow, Mr. Foulis has not been spared to see the completion of the large, new works, one of the largest out of London, that are now in progress at Provan. He held the position of gas engineer to the Glasgow corporation, who are the owners of the local gas works, for 34 years, and during the whole of that time has been engaged in progress and advancement, the effects of which have extended further than Glasgow, and over a wider area than the whole of Scotland. One of his early efforts was the introduction of regenerator firing and the adoption of the system to suit the particular kind of coal met with in Scotland. He was, in fact, a pioneer in the cause, and took to it at a period when many gas engineers looked upon it as too expensive and complicated for adoption in gas works. The extent to which it is now applied is a standing monumeut to his ability and foresight. He gave a great deal of attention to drawing and charging by machinery, and in this respect also events will probably show that he was ahead of his compeers. Space does not admit more than a passing reference to the mechancial details introduced throughout his works for the conveyance of materials and other purposes. He also erected an enriching gas plant for the manufacture of gas from oil; he was the first in the country to put down cyanide recovery plant, and he burned lime on the works. In July, 1869, the capital invested in the gas undertaking was just over half a million sterling, and the annual income something less than half that sum. At present the capital is just under 1½ million sterling, and the income nearly £900,000. The capacity of the plant has been increased from 6 millions per day, in 1869, to something approaching 50 millions when the Provan works are completed, and during the same period the selling price of gas has been reduced from 4s. 7d. to 2s. 4d., just one-half. Mr. Foulis, notwithstanding his extensive business engagements, found time to take part in Gas Managers' Association work and was well known, not only as a writer of papers, but as a frequent speaker in debates. Altogether, one may say, without invidious comparison, that few have done as much for the advancement of the gas industry generally.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

In our report of the annual meeting of the Penn Yan (N. Y.) Gas Light Company it was stated that Mr. W. T. Morris was elected President and Secretary. Mr. Morris was elected President and Treasurer, and Mr. James Gibbons was elected Secretary.

"G. L.," writing to the JOURNAL under date of the 18th inst., says: "Superintendent Goulding has been instructed by President Harwood, of the Natick (Mass.) Gas Light Company, to reset 6 benches of 4's, half depth plan, and also to put the house in shape for a bench of 6's, similar in design and plan to the bench installed last May—also of the half depth type—by Messrs. Waldo Brothers, of Boston, which certainly has proved an excellent piece of work. That bench is fitted with the Isbell-Porter Company's ironwork, including self sealing lids. With a 25 per cent. increase in the output as compared with last year's business, a new holder seems to be in order, and no doubt that necessary bit of construction will come later."

THE proprietors of the Belleville (Can.) Gas Works have decided to offer the same for sale by tender, the competition to close July 31st. Particulars may be had on application to the Company.

AT a meeting of the Executive Council of the staff of Governor Bates, of Massachusetts, the nomination of Samuel W. George, of Haverhill, as a member of the Board of Gas and Electric Light Commissioners, succeeding Mr. Chas. H. Gifford, of New Bedford, was assented to.

THE Plymouth (Ind.) Gas Light and Fuel Company has been incorporated by Messrs. Jno. B. Bowell, P. A. Ball, C. A. Wallace, Clarence Slate, Jno. D. McCoy and Geo. A. Reynolds. It is capitalized in $30,000.

MR. WILLIAM F. ELLIS, a brother of Mr. John W. Ellis, of the Providence (R. I.) Gas Company, died at Somerville, Mass., the afternoon of the 15th inst. He was in his 56th year, and was a civil engineer by profession.

THE coke oven plant constructed by the United Coke and Gas Company, at Sharon, Pa., has been completed. The ovens in the outfit number 612.

A CORRESPONDENT in Dover, N. J., writing under date of the 16th inst., says: "But few gas works established in towns the size of Dover have met with the success achieved by the Dover, Port Oram and Rockaway Gas Company. Dover, Port Oram and Rockaway are towns which fully appreciate a good thing when they have it. Although the plant has been in operation but a little over one year the output on July 4th was 62,000 cubic feet, and has been for a month past about that average. This output is the result of the enterprise of the managers of the Company, who have installed over 1,000 gas appliances and some 700 meters. The managers of the Company promise an output of 100,000 cubic feet per day before December 31, 1904, is reached, and their present record seems to justify the promise. The town of Dover started the 60-horse power Nash gas engine in the new water works, Monday, July 13th. The engine is direct connected to a Smith-Vale-Bierce pump, capable of pumping a 10-inch stream to an elevation of 400 feet into the large reservoirs. The Dover, Rockaway and Port Oram Gas Company furnishes the gas and the output has shown an increase of 15,000 cubic feet per day. The engine uses about 1,200 cubic feet per hour."

THE chief law making powers of Georgia have before them a bill, sponsored by Mr. Reid, of Campbell, which proposes to amend sections 8 to 12 of the General Tax Act, so as to require all gas, water supply,

electric lighting, steam heating and canal companies doing business in the State to make their tax returns to the Comptroller-General, and to pay taxes to the State, counties, towns and cities in the same manner and under the same rules prescribed for returns and payment by the railroad companies of the State.

As a result of the smelling committee appointed by the Board of Health of San Jose, Cal., which committee comprised Drs. Simpson, Brown and McDougall, and who were instructed to examine and report upon the "physical condition" of the local gas works, and its effect over the health of those resident near the works, the following is presented: "The committee visited the gas plant of the United Gas and Electric Company, according to instructions, and were granted every facility for the inspection of the works and the processes involved. The Company had lately changed its system of manufacture, but it was determined that no successful process of gas making is odorless; that the Company was using or following the best methods for reducing the odors to a minimum; that the odors now arising are not of a nature to be a menace to public health or to constitute a nuisance, and that those householders who made the loudest complaint had no proper traps or fresh air vents for their houses, as required under the city ordinances." There is where the "complaining resident," for once anyway, got full measure of justice.

MR. W. W. SCRANTON, proprietor of the Scranton (Pa.) Gas and Water Company, has offered the plants for sale to the local authorities.

BRIEFLY stated the proposition for "the reorganization" of the Bay State Gas Company, of Delaware, is to cut the capital stock from the neat sum of $250,000,000 to $26,000,000, and then to levy an assessment of 33⅓ cents per share on the new capitalization. The remedy is certainly of the drastic order. Meanwhile the issuers of the $250,000,000 are still doing business.

MR. H. L. HARVEY, in accordance with instructions given some time ago to him by the Board of Public Works, of Kansas City, Mo., to reduce to writing his estimates of the cost of installing incandescent burners on 1,000 gas lamps, recently submitted the following: "Acting under your instructions I submit herewith a statement showing the cost of maintaining incandescent gas burners on the city street lamps. There have been in use for the year ended April 30, 1903, an average number of 140 incandescent gas burners on the Pasco and Linwood boulevard at a total cost of $683.29, or $4.88 per lamp, divided as follows: Labor, $3.855; mantles and chimneys, $1.822. The cost of labor can be cut in half by giving one man 300 instead of 150 lamps to care for. He can look after this number and do his work well. The mantles used and included in the total cost have ranged in price from 8½ cents to 20 cents each. The mantle now being used is a cap mantle, costing 8½ cents each, which is giving excellent satisfaction. By buying mantles and chimneys in larger quantities the price will naturally be cheaper and the cost of maintenance can easily be reduced to less than $3 per lamp per year. The city is now paying $12 per year a lamp for each gas lamp giving a 22-candle power light. If equipped with the incandescent burner, giving 60-candle power, the cost will be $15 a lamp per annum."

ST. LOUIS capitalists have applied for a franchise to construct and operate a gas works in Temple, Tex.

AT the annual meeting of the shareholders in the Consolidated Gas Company of Baltimore, Md., the following officers were elected: Directors, H. C. Black, S. H. Stein, James A. Gary, Frederick W. Wood, John A. Whitridge, Charles T. Crane, Townsend Scott, Frank H. Hambleton, Ferdinand C. Latrobe, Daniel C. Ammidon, Charles H. Dickey and Ernest Schmeisser. The Directors elected as officers: Ex-Mayor F. C. Latrobe, President; Mr. Chas. T. Crane, First Vice-President; Mr. Ernst Schmeisser, Second Vice-President; Mr. E. T. Powers, Secretary, and Mr. Joseph H. Clark, Treasurer. The resignation of Mr. William Cabell Bruce as attorney for the Company was received and accepted, but no one was selected as his successor.

A CORRESPONDENT in Philadelphia forwards the following: "The North Penn Gas Company, having purchased a lot at Fort Washington, Pa., is now prepared to push the construction of building and other work necessary to supply Fort Washington, Ambler, Gwynedd and North Wales with gas for illuminating purposes. Plans for the buildings have been already prepared and the work will be done by the Company itself, but the heavy demand of the present time for gasholders and other apparatus may delay the completion of the work until the beginning of winter, by which time it is amply assured the plant can be put into operation and the mains laid. Henry T. Duke, the practical member of the Company, has conferred with representatives of the Ambler Gas Company with a view of having the latter purchase gas from the North Penn Company for the supply of Ambler borough, a franchise for which is exclusively held by the local company. Mr. Duke is President of the Pennsylvania Gas Improvement Company, and is an expert in the erection of modern and up to date plants that can be operated with the very highest economy. The plant at Fort Washington will be located on the lot along the railroad, entrance being effected thraugh the coal yard. The buildings which will be located thereon, it is now stated, are to be erected by a practical man who has just completed the construction of a large plant at Hempstead, L. I. The distributing plant will be of low pressure construction type."

THE Western Gas Construction Company has been awarded a contract by the Cincinnati Gas and Electric Company for the placing of an additional set of purifiers. The set is arranged for three boxes, each 26 feet by 28 feet by 11 feet 6 inches deep, and a feature of the construction is the Western Company's duplex valve, etc., arrangement. The Western Company is also under contract to construct at San Jose, Cal., a 9-foot 6-inch special oil gas plant, to be particularly adapted to crack the heavy oils of the Pacific Coast.

THE authorities of Winnetka, Cook County, Ills., have voted the sum of $75,000 to be used in the building of a gas plant for operation on municipal account. An electric lighting plant has been operated on public account at Winnetka since 1900.

THE authorities of Salem, O., have agreed upon the terms of a franchise stipulating the rates that may be charged for gas by the Salem Gas Light Company for a period of 10 years, dating from the 1st ult. Under the agreement the Company may charge to ordinary consumers for artificial gas the sum of $1.20 per 1,000 cubic feet, less 10 cents per 1,000 when bills are paid within 10 days. The Company may also make a meter charge of 25 cents per month, when the consumption in any month is less than 200 cubic feet. The Company also binds itself to furnish (free of charge) gas to the city hall up to the quantity of 100,000 cubic feet per annum. All gas used on such account in excess of the named quantity shall be billed and paid for at the franchise rates.

THE Cincinnati Gas and Electric Company will construct two storage holders, one of 1,500,000 cubic feet, to be located at the foot of Mill street, the other—of 3,000,000 cubic feet—to be erected at the East End works.

THE Springfield (O.) Company will expend $90,0000 on plant extensions.

AT the annual meeting of the Peoples Gas Light Company, of Rutland, Vt., the following Directors were elected: George C. Clarke, Jno. P. Munn, Robison L. Lea, Guy Phillips, C. H. West and David Fox, Jr.

THE *Journal of Gas Lighting* recently reports that the following interesting question as to whether the person who actually does the work or the one who gives the order for it to be done is liable for the offence of disconnecting a meter without having given the statutory notice to the gas supplying authority, has recently been threshed out at the Goole Petty Sessions. The Goole Urban District Council, who are the owners of the gas undertaking, summoned the workman only; but the Bench, after a full hearing, came to the conclusion that the owner of the property was the responsible party. As, however, they agreed to state a case for the High Court, more is likely to be heard of the matter. The facts are simple. The defendant, when engaged on some other work at the Goole Co-operative Stores, was asked by the manager there to disconnect a meter. Being a plumber, he, of course, knew that such a thing was not allowed; but on his pointing this out to the manager, the latter said the meter was connected with another one, so defendant thought there would be nothing wrong in doing as he was requested. It turned out, however, that, instead of the meter in question being merely connected with another one through which all gas consumed would have to pass, the supply came direct to it from the main, so that the Council were unable to obtain a record of the quantity of gas used. It was therefore quite clear that someone was greatly to blame, and the only question that had to be settled was upon whose shoulders the responsibility should be fixed. The Magistrate's clerk was strongly of opinion that the person giving the order should have been summoned; but on behalf of the Council it was contended that the man who "physically did the work" was liable. The Council declined to take any action against the Co-operative Society, and therefore the Bench, adopting the former view, dismissed the case.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
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OHIO GAS LIGHT ASSOCIATION.

NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, JULY 27, 1903.

The Market for Gas Securities.

The gentlemen who play with other people's fortunes in Wall street had a royal sitting there this week, and those who "coppered" copper, steel and other "active" shares had all the best of it at cashing time. Talk about Canfield, Appleby, "Dave" Johnson, John Daly, and other celebrated controllers of faro layouts! Why, they are only novices in the art of getting money from others easily. Values, to the tune of millions, were simply wiped out of existence, by the banking and brokerage gentlemen who do the dealing in Wall street, and it is to be hoped that the net result in the near future will be the erection and equipment of public libraries, foundling asylums, an occasional hospital, and lots of houses, by the financiers who withstood the struggle. The market for gas securities is simply insensate. It has followed the lead of the main dealers but in less rapid ratio. The bare naming of the quotations tells the story.

The break in Consolidated and in Brooklyn Union as well, will undoubtodly give to those who control those properties an excellent chance to increase their holdings. If the insiders can afford to follow that practice why should not the outsiders have a look in. But the latter content themselves with 5, 10 or 25 shares while the former are taking over their 100, 500 and 1,000 lots. The real feature of the market is the good strength displayed by Peoples, of Chicago.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

JULY 27.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	183⅛	185
Central Union, Bonds, 5's	3,000,000	1,000	109	111
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	299	320
Municipal Bonds	750,000	..	..	
New Amsterdam Gas Co. ..				
Bonds, 5's	11,000,000	1,000	107⅛	108
Northern Union, Bonds, 5's.	1,250,000	1,000	106	107
New York and East River				
Bonds 1st 5's	3,500,000	1,000	110	113
" 1st Con. 5's	1,500,000		109	111
Standard	5,000,000	100	135	140
Preferred	5,000,000	100	155	170
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	190	200
" " Bonds (5's)	15 000,000	1,000	119	119⅛
Bay State	50,000,000	50	¼	⅜
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	500,000	1,000	93	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	4	5
" " Bonds, 5's	5,256,000	1,000	73	76
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Central, San Francisco	1,900,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co.	20,500,000	100	96⅛	97
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	101	101⅛
Columbus (O.) Gas Lt. & Heating Co	1,682,780	100	88¼	89¼
Preferred	3,026,500	100	107½	109
Consumers, Jersey City Bonds	600,000	1,000	100	102
Consumers, Toronto	1,700,000	50	218	225
Consolidated Baltimore	11,000,000	100	66⅛	68
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	85	87
Consolidated G. & E. Co.'s.				
Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co.	4,825,500	50	87	95
" Prior Lien 5's	5,603,000	1,000	99⅛	100
Detroit Gas Co., 5's	381,000	1,000	77	79
" Inc. 5's	16,000	100	98⅛	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104⅛	105
Hartford	750,000	25	245	265
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	56	60
" Bonds, 6's	2,650,000	..	104¾	106
Jackson Gas Co	250,000	50	73	75
" 1st Mtg. 5's	220,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	79	90
Preferred	2,500,000	100	99	100
Bonds	10,000,000	1,000	109⅛	110
Lafayette Gas Co., Ind.	1,000,000	100	.	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	130	140
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	107½	108½
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	184¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	105	105¾
New Haven	1,000,000	25	300	325
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	.
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	96⅝	96¾
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	0,000,000	100	51½	52
St. Joseph Gas Co.				
" 1st Mtg. 5's	751,000	1,000	95	96⅛
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	92	93
Syracuse, N. Y.	1,975,000	100	46	48
Bonds	2,047.000	1,000	98½	99⅛
Washington, D. C	2,600,000	20	310	320
First mortgage 6's	600,000	..	..	..
Western, Milwaukee.				
Bonds, 5's	4,000,000	..	109⅛	110
Wilmington, Del.	600,000	50	232	..

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SITUATION WANTED
AS MANAGER,

By a young man. Successful in economical operation and developing new business. Thoroughly practical and experienced in all branches. Can guarantee results. Energetic and progressive. Address, "C. G. M.,"
1468-2 Care this Journal.

WANTED,
Position as Manager of a Gas Company

That is much in need of a man thoroughly familiar with all details of the business. A position where the business and public confidence are much impaired, requiring the right man, at the right place, at the right time, preferred.
1462-tf Address, "ABILITY," care this Journal.

POSITION WANTED
AS MANAGER or SUPERINTENDENT,

By a successful hustler for new business. Experienced in selling gas stoves; laying high and low pressure mains; understands the manufacture of coal and water gas in detail; also, reconstruction of benches and water gas apparatus. Superintendent of gas company for a number of years. Will find me up-to-date and energetic young man. Can furnish best of references. Address,
1465-5 "PUSHER," care this Journal.

WANTED,

A young man, thoroughly experienced in operating regenerative benches and in the general practice of coal gas working, to take charge of the manufacturing and distributing d partments for gas company in town of 30,000 population in the Southwest. Salary, $100 per month. Address, stating experience and giving references,
1467-2 "S. G. L.," care this Journal.

WANTED,
Capable Man as Manager of Gas and Electric Plant

In small seacoast town in California. Must have had some experience, and especially in connection with development of gas business. Salary, $1,500 annually, with opportunity for advancement. Town growing; good field; position permanent. Address, with references and stating experience,
CALIFORNIA LIGHT AND FUEL COMPANY,
1465-4 576 Parrott Building, San Francisco, Cal.

WANTED,
SECOND-HAND STATION METER,

Suitable for gas company manufacturing from 3 to 4 million cubic feet of gas per year. Give manufacturer's name, capacity and condition. Price figured on, F. O. B.
Address, GEO. W. GRAVES, care "THE HICKS,"
1465-tf Asbury Park, N. J.

METER FOR SALE.
One 300-Light Maryland Meter.

The Maryland Meter Company will vouch for good condition of this meter. For particulars, address,
1465-tf OTTAWA GAS LIGHT & COKE CO., Ottawa, Ills.

FOR SALE.
One High Pressure Roots' Exhauster and Engine,

On one bed. This machine is practically new, and has been delivering 100,000 per day, through 8 miles of 4-inch pipe line. Engine is direct connected to exhauster, and with them is included one cooling tank and all 8-inch connections.
1457-tf Address, "F. R. V.," care this Journal.

FOR SALE.

Two Rectangular, Cast Iron, Water Tube Condensers, 5 feet 6 inches wide, by 15 feet 10 inches high, by 36 feet 10 inches long, with 20-inch valves and connections.
One Rectangular, Cast Iron Scrubber, 5 feet 6 inches wide, by 12 feet high, by 36 feet 10 inches long, with 20-inch valves and connections.
Sixteen Sections of Cast Iron Hydraulic Main, 8 feet 4 inches long by 24 inches, for benches of 6's; dip and bridge pipes; 7-inch ascension pipes; supports for hydraulic main; 4 take-off ends, with 12 inch outlets; adjustable valves, with Hutchison tar draw-off pots.
Seventy-eight Self-Sealing Mouthpieces, each 13 by 24.
One Fuller Vertical Engine, 8 by 12, with exhauster governor.
One Fuller Vertical Engine, 9 by 14, with exhauster governor.
One McKenzie Exhauster, 16-inch valves and connections.
One Wilbraham Exhauster, 16-inch valves and connections.
One 12-Inch By-Pass, with Smith & Sayre compensator; 6-inch connections.
One P. & A. Tar Extractor, 1,000,000 cubic feet capacity; 16-inch connections.
One Wrought Iron Tower Scrubber, 6 feet diameter by 29 feet 6 inches high; 16-inch valves and connections.
Two Wrought Iron Scrubbers, 7 feet diameter by 16 feet high, with 16-inch valves and connections.
Three Wrought Iron Condensers, each 6 feet diameter by 16 feet high, with 16-inch valves and connections.
Two Standard Washer-Scrubbers, No. 13, with 20-inch valves and connections.

All the above apparatus, if examined at once, can be seen connected and in operation. It will be removed to give room to larger apparatus. Any further information can be obtained from the PROVIDENCE GAS COMPANY,
1462-tf Providence, R. I.

FOR SALE,
Two Settings of Single Superheater Lowe Water Gas Apparatus.

Address,
WILLIAMSPORT GAS COMPANY,
1463-tf WILLIAMSPORT, PA.

PROPOSALS

Will be received by the South Bend Fuel and Gas Company for their output of
AMMONIA
(concentrated liquor), for a period of one year. Address,
SOUTH BEND FUEL & GAS COMPANY,
1468-2 SOUTH BEND, IND.

NOTICE TO CONTRACTORS.

KANSAS CITY, MO., July 24, 1903.

Sealed bids will be received at the office of Secretary of Board of Public Works, at City Hall, Kansas City, Mo., up to 2 P.M., Monday, August 3d, 1903, for furnishing the following:

One Thousand Incandescent Gas Burners

for street lamps, capable of giving 60-candle power light. Sample of burner must accompany bid.

A certified check for 5 per cent. of amount bid must be filed at same time as a guarantee that bidder who receives award will enter into contract.

The Board of Public Works reserves the right to waive any informality in any bid, or to reject any or all bids.

ROBERT E. KING,
1468-1 SECRETARY BOARD OF PUBLIC WORKS.

Gas Analyses of All Sorts and Conditions
—OR—
Analyses of Solid and Liquid Materials as Well,

That are needed by Gas Companies at any time in the conduct of their business, may be obtained from

DR. W. H. BIRCHMORE,
1421-tf 341 ADELPHI ST., BROOKLYN, N. Y.

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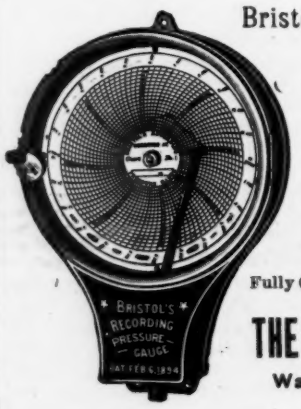

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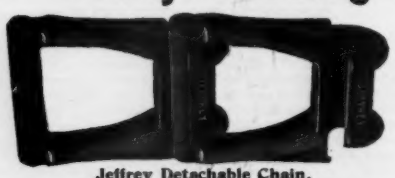

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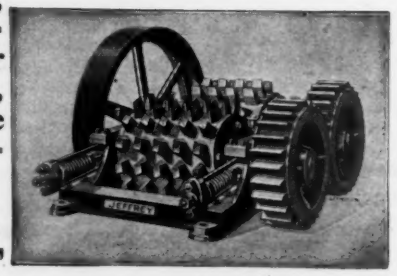

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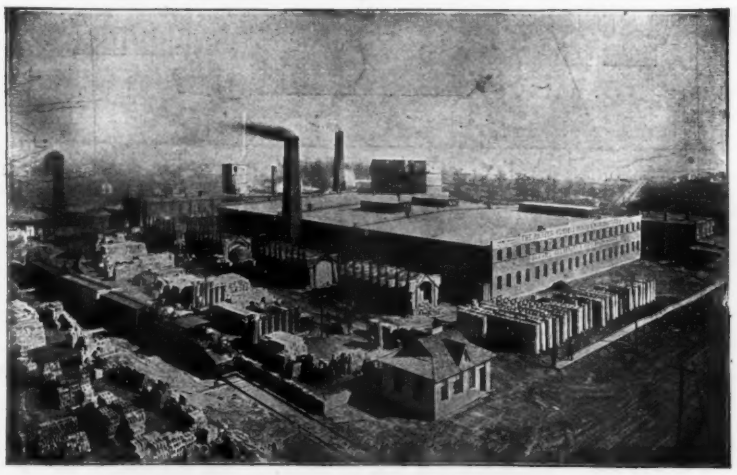

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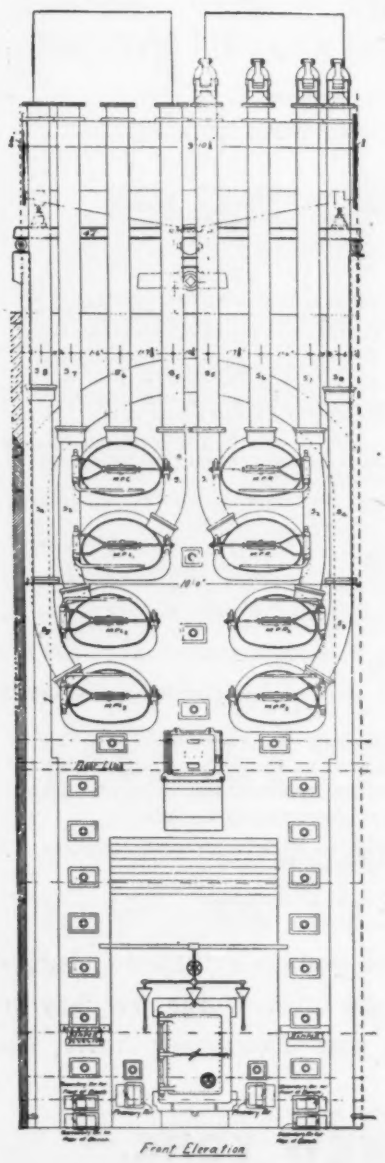

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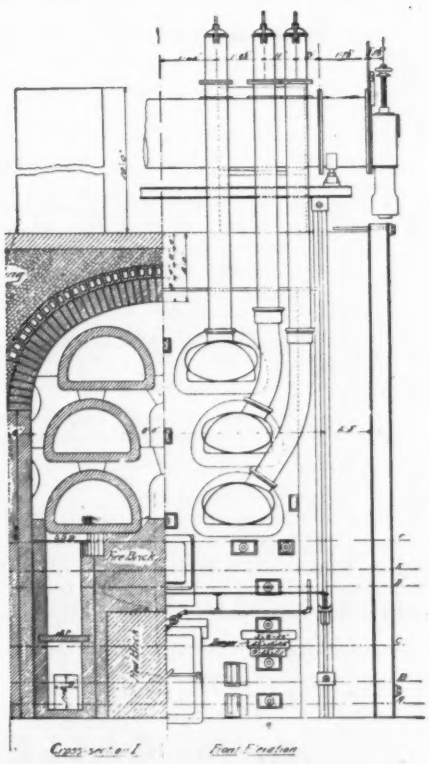

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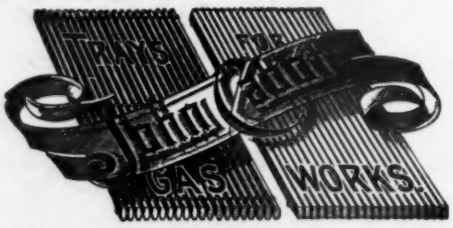

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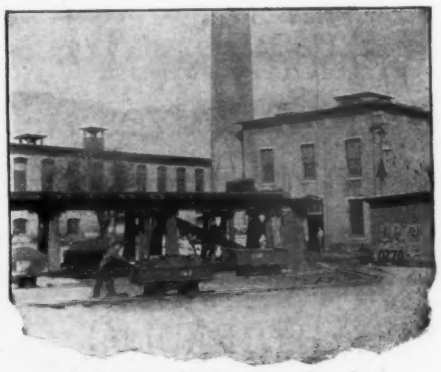

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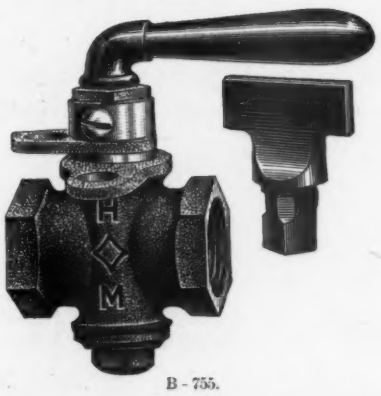

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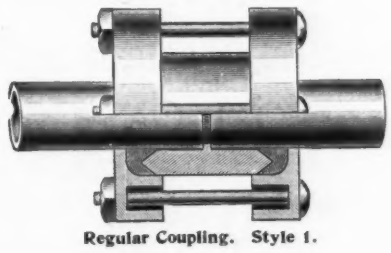

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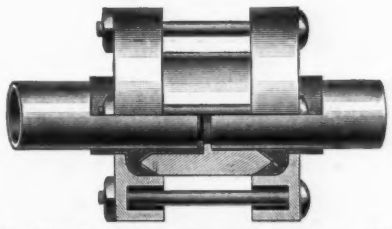

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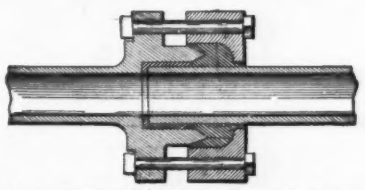

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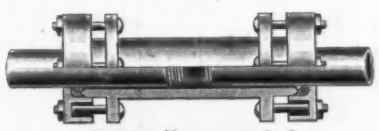

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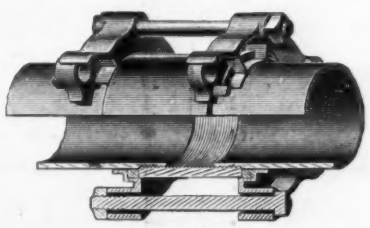

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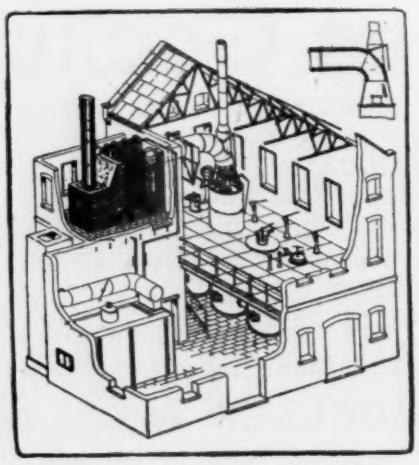

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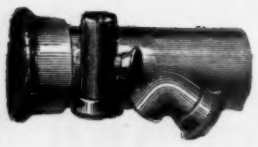

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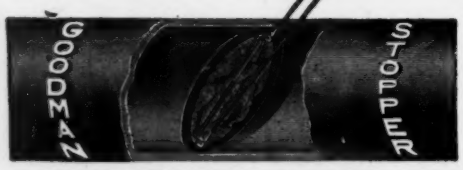

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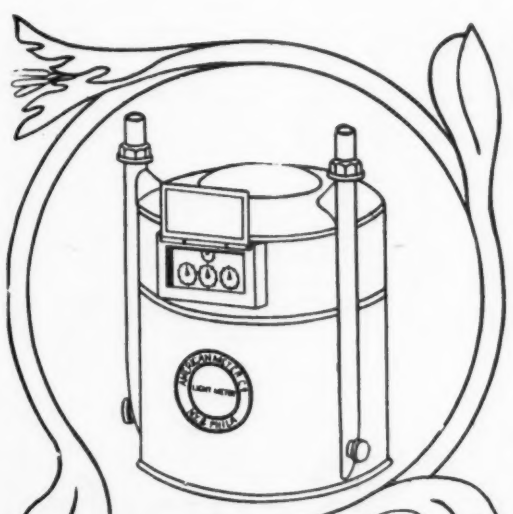
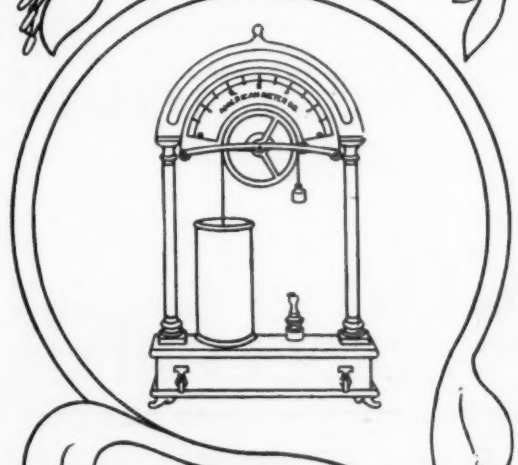
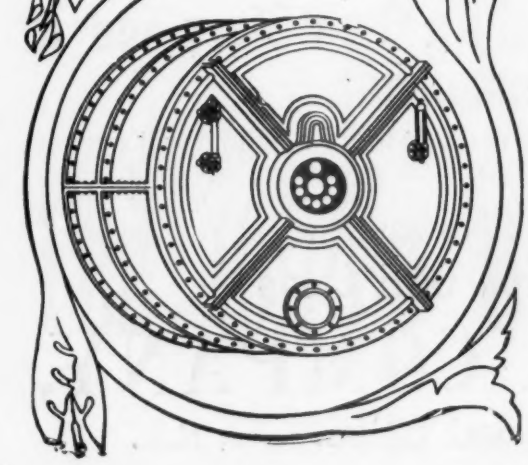






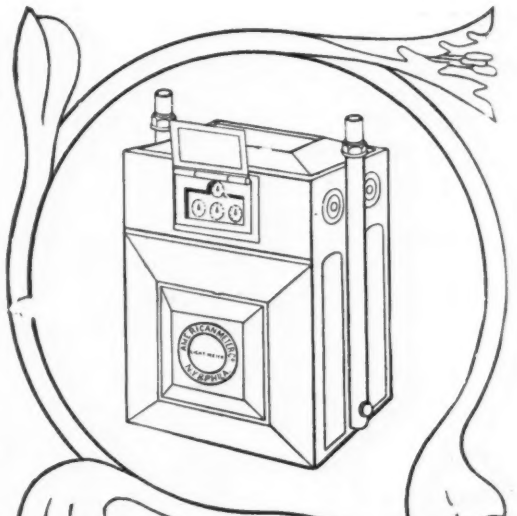
PUBLIC LIGHTING TABLE.

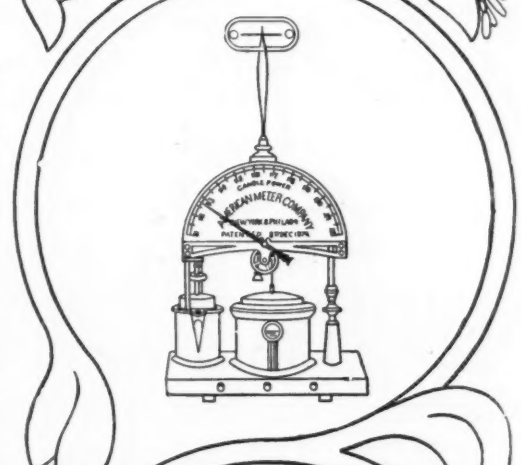
AUGUST, 1903.

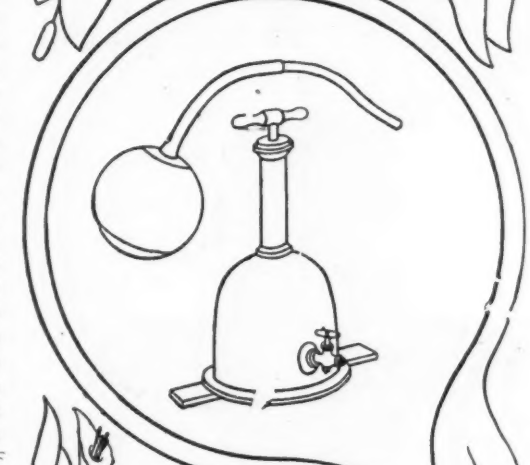
Day of Week.	Table No. 1. FOLLOWING THE MOON. Date.	Light.	Extinguish.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light.	Extinguish.
				P.M.	A.M.
Sat.	1	11.20 PM	3.50 AM	7.10	3.30
Sun.	2	12.10 AM	4.00	7.10	3.30
Mon.	3	1.00	4.00	7.10	3.30
Tue.	4	1.40	4.00	7.10	3.30
Wed.	5	2.30	4.00	7.10	3.30
Thu.	6	No L.	No L.	7.10	3.45
Fri.	7	No L. FM	No L.	7.10	3.45
Sat.	8	No L.	No L.	7.10	3.45
Sun.	9	7.30 PM	8.40 PM	7.10	3.45
Mon.	10	7.30	9.10	7.10	3.45
Tue.	11	7.30	9.40	7.10	3.45
Wed.	12	7.30	10.10	7.10	3.45
Thu.	13	7.30	10.40	6.55	4.00
Fri.	14	7.30	11.20	6.55	4.00
Sat.	15	7.30 LQ	11.50	6.55	4.00
Sun.	16	7.20	12.40 AM	6.55	4.00
Mon.	17	7.20	1.30	6.55	4.00
Tue.	18	7.20	2.30	6.55	4.00
Wed.	19	7.20	4.10	6.55	4.00
Thu.	20	7.20	4.10	6.45	4.10
Fri.	21	7.20	4.10	6.45	4.10
Sat.	22	7.20 NM	4.10	6.45	4.10
Sun.	23	7.10	4.20	6.45	4.10
Mon.	24	7.10	4.20	6.45	4.10
Tue.	25	7.10	4.20	6.45	4.10
Wed.	26	7.10	4.20	6.45	4.10
Thu.	27	8.40	4.20	6.30	4.20
Fri.	28	9.20	4.20	6.30	4.20
Sat.	29	10.00 FQ	4.20	6.30	4.20
Sun.	30	10.50	4.30	6.30	4.20
Mon.	31	11.40	4.30	6.30	4.20

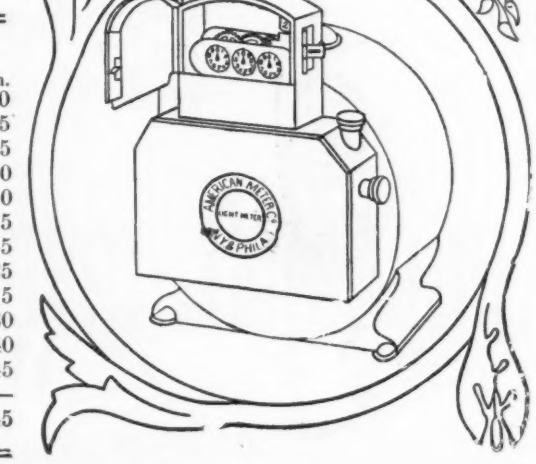
TOTAL HOURS LIGHTING DURING 1903.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	245.00	January	423.20
February	192.00	February	355.25
March	201.00	March	355.35
April	167.20	April	298.50
May	152.00	May	264.50
June	131.00	June	234.25
July	140.40	July	243.45
August	156.20	August	280.25
September	171.20	September	321.15
October	198.20	October	374.30
November	216.30	November	401.40
December	232.10	December	433.45
Total, yr.	2203.40	Total, yr.	3987.45









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The formula is simple-

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The imitation stuff is bad for the customer---which is bad for you.

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The Welsbach Gas Arc for Indoor Lighting.

The cut tells the story—but not all of it. Get one lamp and light it—then the tale's told from beginning to end. For one Welsbach Gas Arc Lamp is a better salesman than 20 pages of advertising.

Here's what it would show if you give it a chance to prove its worth:

1. A mechanical construction and finish that insures the greatest durability.
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3. The greatest amount of candle power with least consumption of gas.
4. A by-pass cock so constructed as to permit all or only one mantle burning at a time.
5. A pilot light that consumes but 1 foot of gas in 24 hours. Costs $\frac{1}{10}$ of a cent a day.

Give it a Chance to Tell its Own Story and it Won't Disappoint.

Let us send you one lamp—doesn't cost a fortune—and it will answer every question you put to it; make good on every test given it. You know the only proof of the pudding? What's the use in a fellow telling you it tastes good? Taste it yourself, then you know.

May we Send you ONE Lamp?

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Amesbury, Mass.	Lynn, Mass.	Savannah, Ga.
Aberdeen, S. D.	Newark, N. J.	New York (Central Union Co.)
Winsted, Conn.	Washington, D. C.	Cicero, Ills.
Canon City, Col.	Boone, Ia.	Chicago (Ogden Co.)
Schenectady, N. Y.	Pueblo, Col.	Easton, Pa.
Hagerstown, Md.	Charlotte, N. C.	Lawrence, Mass.
Malden, Mass.	Fall River, Mass.	Council Bluffs, Ia.
Bridgeport, Conn.	Duluth, Minn.	Chattanooga, Tenn.
Albert Lea, Minn.	New York (Mutual Co.)	

TOTAL SETS TO JULY 1, 1903, ... 51
TOTAL DAILY CAPACITY, ... 55,150,000 cubic feet.
TOTAL SETS TO DATE, ... 498
TOTAL DAILY CAPACITY, ... 354,830,000 cubic feet.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
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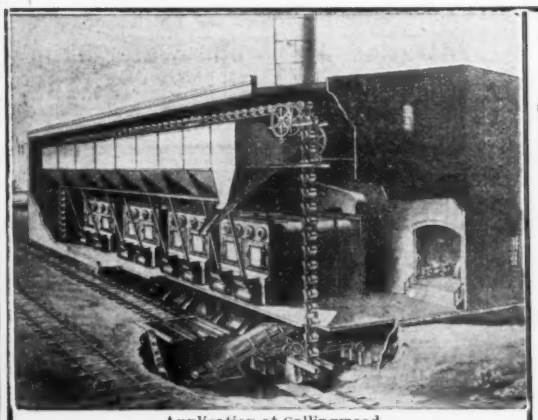

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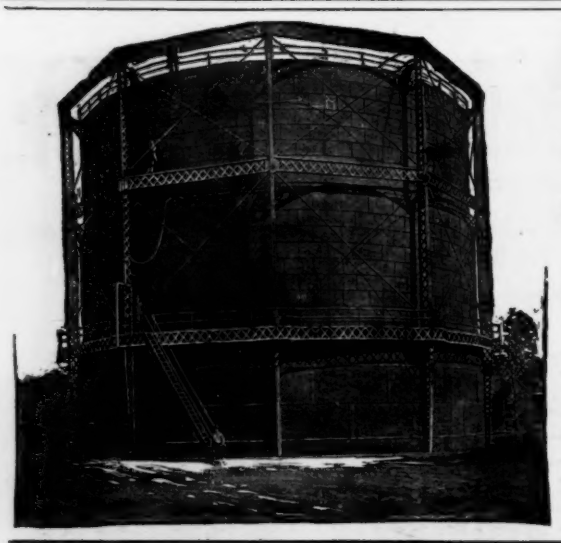

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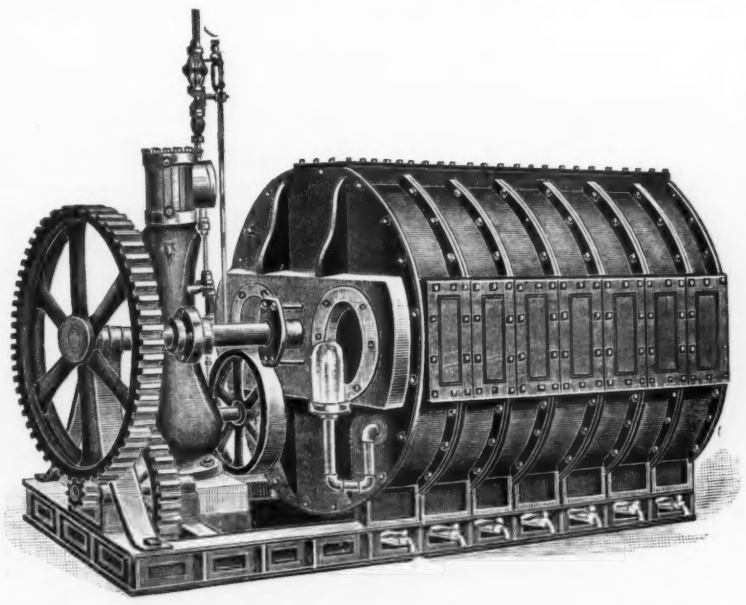

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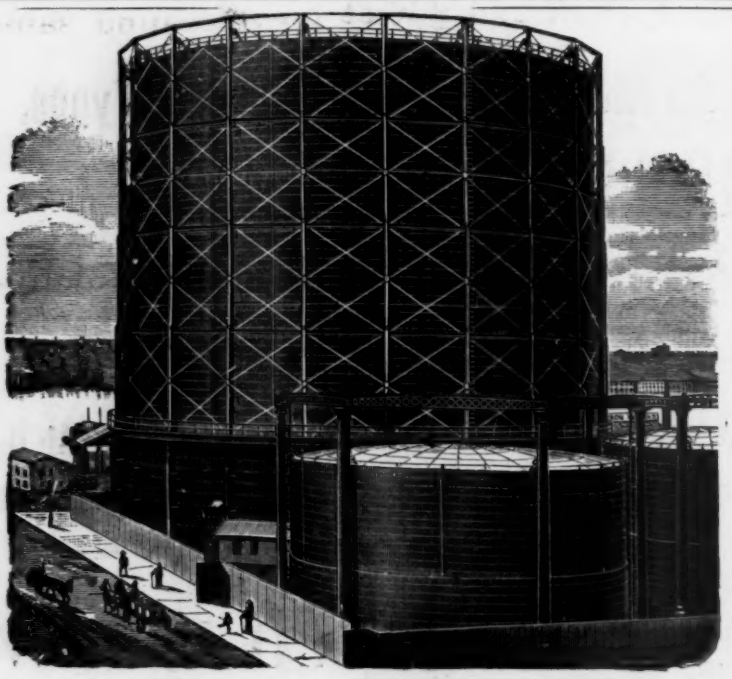

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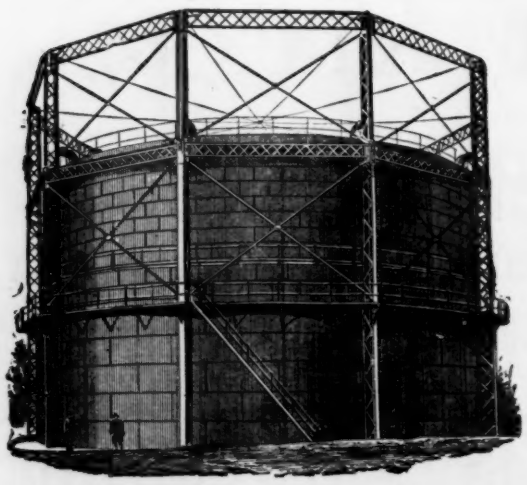

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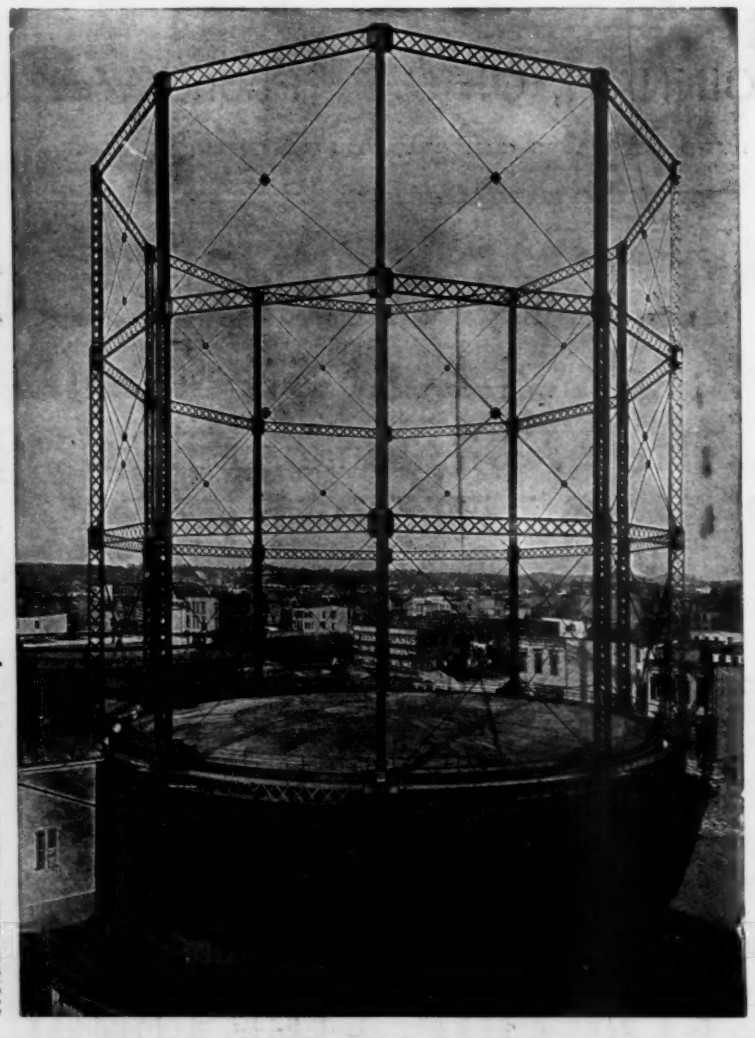

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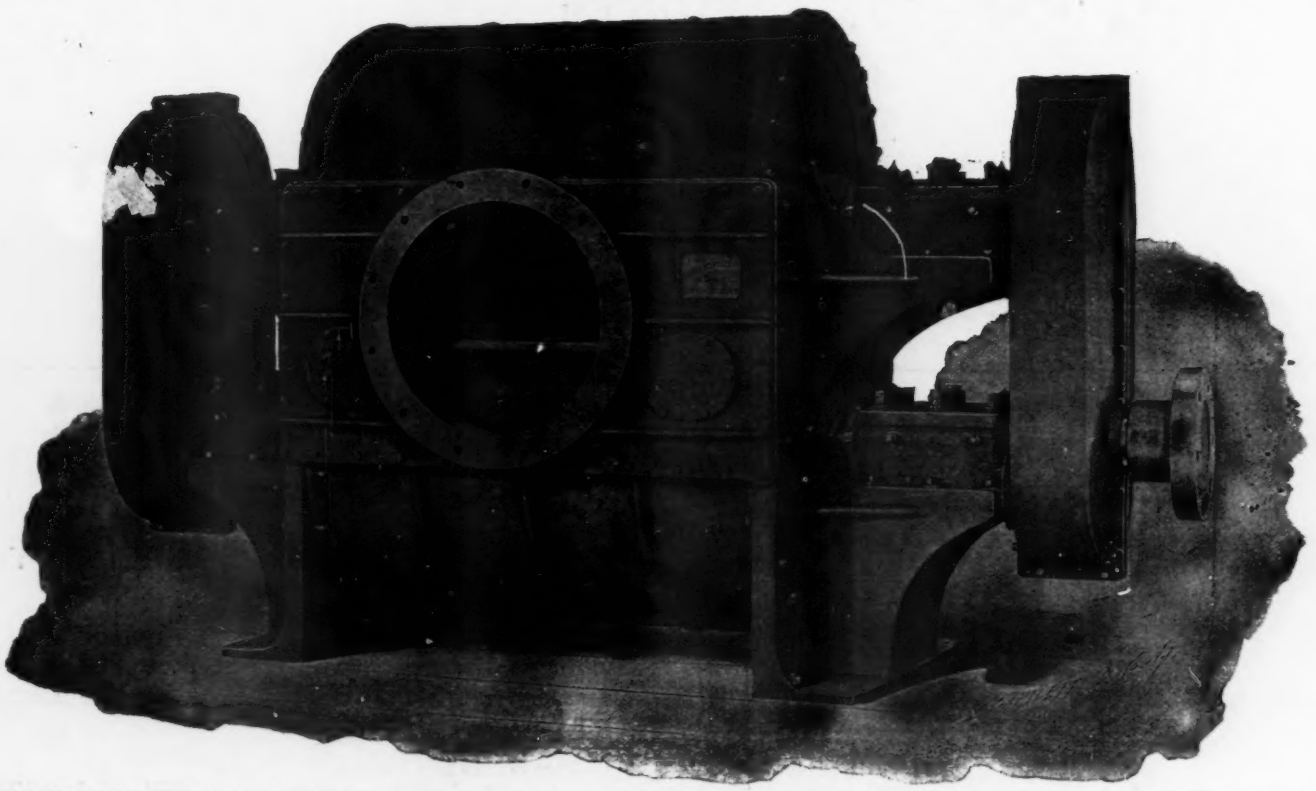

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